**Energy Security Requires Diversity: An Argument for The Defense Production Act Title III Biofuel Initiative**

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14. ABSTRACT
**The U.S. military has historically taken a role in technological advancements, helping to create mature industries which are cost-competitive after an initial period of federal financial support. After 40 years of national security strategy in which the military was called upon to react to our nation?s overreliance on politically unstable sources of conventional fuel, the time has come to create a domestic alternative fuels market which will enhance American energy independence and security. The United States Navy has taken the lead in this charge by proposing the Defense Production Act (DPA) Title III Biofuel Initiative to assist the development of a sustainable commercial biofuels industry which will help the nation achieve energy security by providing diversity of energy supply which will reduce the power the oil market has over the nation as a whole. Section II of this paper discusses the nation?s demand for petroleum, how it has impacted national security strategy, and examines the political, economic, and military costs of reliance on oil. Section III reviews the historical uses of the DPA in which the federal government has provided financial support to industries critical to the national defense. Section IV introduces the DPA Title III Advanced Drop-in Biofuels Production Project, which is discussed in terms of political and technological viability. The commercial aviation industry?s pursuit of biofuels is discussed and the benefits of long-term contracting and hedging are explored. It concludes with the recommendation to allow the biofuel initiative to work to create a domestic advanced biofuel industry before the next oil crisis occurs.**

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## Disclaimer

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Abstract

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The U.S. military has historically taken a role in technological advancements, helping to create mature industries which are cost-competitive after an initial period of federal financial support. After 40 years of national security strategy in which the military was called upon to react to our nation's overreliance on politically unstable sources of conventional fuel, the time has come to create a domestic alternative fuels market which will enhance American energy independence and security. The United States Navy has taken the lead in this charge by proposing the Defense Production Act (DPA) Title III Biofuel Initiative to assist the development of a sustainable commercial biofuels industry which will help the nation achieve energy security by providing diversity of energy supply which will reduce the power the oil market has over the nation as a whole.

Section II of this paper discusses the nation's demand for petroleum, how it has impacted national security strategy, and examines the political, economic, and military costs of reliance on oil. Section III reviews the historical uses of the DPA in which the federal government has provided financial support to industries critical to the national defense. Section IV introduces the DPA Title III Advanced Drop-in Biofuels Production Project, which is discussed in terms of political and technological viability. The commercial aviation industry's pursuit of biofuels is discussed and the benefits of long-term contracting and hedging are explored. It concludes with the recommendation to

allow the biofuel initiative to work to create a domestic advanced biofuel industry before the next oil crisis occurs.

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## I. Introduction

The U.S. military has historically taken a role in technological advancements, helping to create mature industries which are cost-competitive after an initial period of federal financial support. After 40 years of national security strategy in which the military was called upon to react to our nation's overreliance on politically unstable sources of conventional fuel, the time has come to create a domestic alternative fuels market which will enhance American energy independence and security. The United States Navy has taken the lead in this charge by proposing the Defense Production Act Title III Biofuel Initiative to assist the development and support of a sustainable commercial biofuels industry.

The United States has dealt with the effects of energy insecurity in the form of oil shocks three times since the 1970s.[1] These oil shocks resulted in economic dislocation, recession, and an increase in unemployment.[2] In response to these events, national policymakers have struggled to create domestic policy and national defense strategy which mitigate the effects of a volatile global oil market. Too often, the proposed solution to the nation's energy security problem is simply to reduce our dependence on foreign oil. While reducing dependence on foreign oil is an important part of attaining energy security, it is not a stand-alone solution. Since nation's heavy dependence on oil,

[1] SECURING AMERICA'S FUTURE ENERGY, The new American Oil Boom (2012), available at http://www.secureenergy.org/sites/default/files/SAFE_Oil_Boom_Reportpdf.
[2] *Id.*

regardless of source, is what makes our economy so vulnerable to price and availability shifts in the global oil market, there is a clear need for alternative energy sources in the U.S. While there is room for the transportation sector to reduce its dependence on oil with the use of electric cars, the U.S. military operates platforms which are all heavily fuel dependent and too costly to replace. Therefore, the military has begun to explore the use of renewable fuels to meet its operational energy needs. In June 2011, the Departments of the U.S. Navy, Energy, and Agriculture signed a Memorandum of Understanding (MOU) that proposed relying on The Defense Production Act (DPA) authorities to support the development of advanced drop-in biofuels.[3] The development of a domestic advanced drop-in biofuel industry will help the nation achieve energy security by providing diversity of energy supply which will reduce the power the oil market has over the nation as a whole. As a customer seeking to reduce its reliance on conventional petroleum in order to complete its mission within budget, the U.S. Navy has an interest in accelerating the development of the domestic advanced drop-in biofuel industry. The biofuel initiative must begin now as America's strategic orientation away from land wars and toward Pacific maritime supremacy[4] will require a significant increase in deep-water patrolling, and therefore the U.S. Navy must have a plan in place to ensure it will have ready access to fuel in order to complete its mission. The decision to promote development of the biofuel industry is the most effective plan as it is

[3] Memorandum of Understanding Between the Department of the U.S. Navy and the Department of Energy, and the Department of Agriculture (June 2011), *available at* http://www.rurdev.usda.gov/SupportDocuments/DPASignedMOUEnergyU.S.NavyUSDA.pdf.

[4] U.S. DEPARTMENT OF DEFENSE, SUSTAINING U.S. GLOBAL LEADERSHIP: PRIORITIES FOR 21ST CENTURY DEFENSE (Jan. 2012) *available at* http://www.defense.gov/news/defense_strategic_guidence.pdf.

beneficial to risk mitigation, cost controls, and mission effectiveness, while at the same time being environmentally sound. As this all advances national security, Title III of the DPA was appropriately used to provide a means of funding the biofuel initiative. Lawmakers should not attempt to block or refuse to fund the biofuel initiative, as that would be a waste of the funds already committed and of the opportunity the biofuel initiative provides in attaining energy security.

Section II of this paper discusses the nation's demand for petroleum, how it has impacted national security strategy, and examines the political, economic, and military costs of reliance on foreign oil. If the U.S. is better prepared to weather interruptions in the flow of conventional oil, it has less reason to send troops into harm's way. While it is impossible to completely eliminate the need for imports, reduced dependence on oil will reduce the power the market has over the U.S.'s economy and foreign policy, and the resulting costs.

Section III reviews the historical uses of the Defense Production Act in which the *federal government has provided financial support to industries crucial to the national* defense. It examines the use of the DPA for energy infrastructure projects, specifically the reasoning for the development and early termination of the Synthetic Fuels Corporation. It points out that the lesson to be learned from the SFC case is that the nation has a history of being unable to sustain interest (and funding) for alternative energy sources when faced with ready access to conventional oil products. The Navy's history as an energy first adopter is detailed, and the section concludes with why that history makes the Navy ideally suited to be a first adopter of biofuels.

Section IV introduces the DPA Title III Advanced Drop-in Biofuels Production Project, which is discussed in terms of political and technological viability. The commercial aviation industry's pursuit of biofuels is discussed because, together with the U.S. Navy, they can send a strong demand signal to the biofuel industry. Finally, the benefits of long-term contracting and hedging are explored.

## II. Energy Security Requires Diversity

The U.S. Department of Defense (DOD) has recently acknowledged that the U.S.'s historical over-reliance on petroleum has had economic, strategic, and environmental drawbacks.[5] These drawbacks have diminished the energy security of the U.S. The addition of alternative energy sources will reduce the political, economic and military costs of reliance on foreign oil and increase the nation's energy security. Energy security refers to the uninterrupted availability of energy sources at an affordable price.[6] The U.S. Navy defines energy security as "having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet our war fighting and installation needs."[7] This section discusses the need to encourage development of alternate energy sources in the context of the great demands for petroleum made by the world, the United States, and the U.S. Navy. It reviews the political and economic cost of relying on foreign oil, particularly from the Middle East, and how that dependence has shaped U.S. foreign and domestic policy. Finally, the military and human costs of a

[5] *See* DEPARTMENT OF DEFENSE, OPERATIONAL ENERGY STRATEGY: IMPLEMENTATION PLAN (March 2012) *available at* http://energy.defense.gov/Operational_Energy_Strategy_Implementation_Plan.pdf.
[6] INTERNATIONAL ENERGY AGENCY, Energy Security, http://www.iea.org/topics/energysecurity/ (last visited Aug. 1, 2013).
[7] U.S. NAVY, ENERGY, Environment and Climate Change, Energy, http://greenfleet.dodlive.mil/energy/ (last visited July 15, 2013).

national strategy focused on protecting the flow of oil though international chokepoints are discussed. These factors support the U.S. Navy's argument that development of a domestic advanced drop-in biofuel industry will help the nation achieve greater energy security. They highlight why the U.S. Navy, as both a consumer of energy and as the branch of the military tasked with protecting the passage of oil by sea, has an interest in accelerating the development of the domestic advanced drop-in biofuel industry

### A. The Demand for Energy

Global oil consumption in 2012 was 89 million barrels per day.[8] Of that, the U.S. consumed approximately 20 percent or 18 million barrels per day.[9] Dependent on liquid fuels for transportation, the U.S. used 70 percent of the 18 million barrels per day of oil for transportation. The U.S. produced 10 million barrels per day, while Saudi Arabia and Russia produced 11 and 10.3 million barrels per day, respectively. The United States relied on net imports (imports minus exports) for about 40 percent of the petroleum products that were consumed in 2012.[10] Just over half of these imports came from the Western Hemisphere.[11] About 29 percent of U.S. imports of crude oil and petroleum products came from the Persian Gulf countries of Bahrain, Iraq, Kuwait, Qatar, Saudi

[8] U.S. ENERGY INFORMATION ADMINISTRATION, INTERNATIONAL ENERGY OUTLOOK 2013, (July 2013) *available at* http://www.eia.gov/forecasts/ieo/?src=home-b1.
[9] *Id.* Second and third in consumption were China and Japan, at 11 and 5 million barrels per day, respectively. *Id.*
[10] U.S. ENERGY INFORMATION ADMINISTRATION, ENERGY IN BRIEF (May 2013), *available at* http://www.eia.gov/energy_in_brief/article/foreign_oil_dependence.cfm.
[11] *Id.*

Arabia, and United Arab Emirates.[12] The U.S.'s largest sources of net crude oil and petroleum product imports were Canada and Saudi Arabia.[13]

Overall, the U.S.'s dependence on foreign petroleum has declined since peaking in 2005.[14] Reversing a decline that began in 1986, crude oil production in the U.S. has increased since 2008 from five million barrels per day to six and one-half million barrels per day in 2012.[15] The U.S. Energy Information Administration (EIA) predicts that improvements in advanced crude oil production technologies will continue to increase domestic supply over this decade before declining gradually beginning in 2020.[16] The recent and near term growth come largely from a significant increase in onshore crude oil production, particularly from shale and other tight oil formations which, in turn, has been spurred by technological advances and relatively high oil prices.[17] Tight, or shale, oil development is still at an early stage, and according to the EIA, the outlook is still highly uncertain.[18]

The International Energy Outlook 2013 projects that world energy consumption will grow by 56 percent between 2010 and 2040.[19] World use of petroleum and other liquid fuels will grow from 87 million barrels per day in 2010 to 97 million barrels per day in 2020 and 115 million barrels per day in 2040.[20] Renewable energy and nuclear power are the world's fastest-growing energy sources, and are projected to increase by

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[12] *Id.*
[13] *Id.*
[14] *Id.*
[15] *Id.*
[16] INTERNATIONAL ENERGY OUTLOOK 2013, *supra* note 8.
[17] *Id.*
[18] *Id.*
[19] *Id.*
[20] *Id.*

two and one-half percent per year.[21] However, it is predicted that fossil fuels will continue to supply almost 80 percent of world energy use through 2040.[22] The EIA predicts that growth in demand in emerging markets such as China, India, and Brazil will not keep pace with supply, and oil prices will continue to rise.[23] High oil prices will continue to impact the U.S. because it is a key input to the economy, especially the transportation sector.[24] At present, as petroleum prices increase, U.S. consumers have no choice but to pay the price because there are no viable alternative energy sources, which means that oil demand is price inelastic.[25] As U.S. consumers spend more on oil, they spend less on all other goods and services, and the economy slows.

The DOD is the largest consumer of energy in the federal government.[26] The DOD consumed 117 million barrels of oil in 2011,[27] spending approximately 17.3 billion dollars, which comprised 2.5 percent of its total expenditures, and 6 percent of the operations and maintenance expenditures.[28] Energy use by the DOD falls into two categories, operational and installation energy. Section 2821(a) of the 2012 National

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[21] *Id.*
[22] *Id.*
[23] *Id.*
[24] SECURING AMERICA'S FUTURE ENERGY, The new American Oil Boom, *supra* note 1.
[25] *Id.*
[26] U.S. ENERGY INFORMATION ADMINISTRATION, ANNUAL ENERGY REVIEW, Table 1.13 U.S. Government Energy Consumption by Agency and Source, Fiscal Years 2003, 2010, and 2011(Trillion Btu), *available at* http://www.eia.gov/totalenergy/data/annual/showtext.cfm?t=ptb0113.
[27] DEFENSE ENERGY SUPPORT CENTER, FACTBOOK FY11, *available at* http://www.energy.dla.mil/energy_enterprise/Documents/Factpercent20Bookpercent20FY2011percent20Rev.pdf.
[28]CONGRESSIONAL RESEARCH SERVICE, calculations using budget figures from National Defense Budget Estimates for FY2013, Table 1-5, "National Defense Outlays," p.10, *available at* http://comptroller.defense.gov/defbudget/fy2012/FY12_Green_Book.pdf.

Defense Appropriations Act (NDAA)[29] defines operational energy as "the energy required for training, moving, and sustaining military forces and weapons platforms for military operations. The term includes energy used by tactical power systems and generators and weapons platforms. Installation energy is not defined in law, but in practice refers to energy used at installations, including by non-tactical vehicles, that does not fall under the definition of operational energy.[30] At this time, 75 percent of DOD's energy use is operational energy and 25 percent is installation energy.[31] However, the DOD's use of operational energy is dependent on the number, location, scale, and tempo of military operations around the world. Although DOD petroleum use has declined somewhat over the past seven years, petroleum costs have increased 381 percent in real terms, from 4.5 billion dollars in 2005 to approximately 17.3 billion dollars in 2011.[32] The DOD estimates that for every 1 dollar increase in the price of a barrel of oil, there is an additional 130 million dollars in increased fuel costs.[33] The U.S. Navy uses approximately 30 million barrels of oil a year at a cost of approximately 4.5 billion

[29] NATIONAL DEFENSE AUTHORIZATION ACT 2012, Pub. L. No. 112-81, 125 Stat. 1521 (2011). Codified at 10 U.S.C. 2924.
[30] OFFICE OF THE DEPUTY UNDERSECRETARY OF DEFENSE (INSTALLATIONS AND ENVIRONMENT), DEPARTMENT OF DEFENSE ANNUAL ENERGY MANAGEMENT REPORT, FISCAL YEAR 2010 (July 2011).
[31] ASSISTANT SECRETARY OF DEFENSE FOR OPERATIONAL ENERGY PLANS AND PROGRAMS, ENERGY FOR THE WARFIGHTER: OPERATIONAL ENERGY STRATEGY (June 2011).
[32] CONGRESSIONAL RESEARCH SERVICE calculations using budget figures from National Defense Budget Estimates for fiscal year 2013, Table 5-9, "Department of Defense Deflators – Outlays," p.62, *available at* http://comptroller.defense.gov/defbudget/fy2012/FY12_Green_Book.pdf.
[33] THE WHITE HOUSE, Fact Sheet, Obama Administration Announces Additional Steps to Increase Energy Security (April 2011) *available at* http://www.whitehouse.gov/the-press-office/2012/04/11/fact-sheet-obama-administration-announces-additional-steps-increase-ener.

dollars (in fiscal year 2011) and the Navy's overall budget for fiscal year 2012 was 173 billion dollars.[34]

The nation, thus far, has been unwilling to fundamentally reduce oil dependency.[35] Therefore, the nation has remained dependent on the supply of oil from foreign sources, most significantly the Middle East. The U.S. Navy, as a U.S. consumer of oil, has therefore also been reliant on oil from the Middle East, and subjected to the effects of price and supply volatility.

### B. The Political and Economic Cost of Reliance on Oil

Oil imports have been a political and strategic concern ever since the 1940s, when the U.S. began to import more than it exported.[36] Although half of the petroleum the U.S. imported in 2011 came from the Western Hemisphere, if the U.S. failed to secure the production and transit of oil from the Persian Gulf, prices for oil produced in the west would increase exponentially because oil is sold on a global market.[37] Therefore, America's strategic leadership and the actions of our allies continue to be compromised by a need (or perceived need) to avoid antagonizing some critical oil suppliers. The issue first came to a head in the early 1970s, when the first OPEC embargo caused oil prices to quadruple, contributed to an inflationary spiral, and generated tensions across the Atlantic

[34] Interview with Chris Tindal, Director for Operational Energy, Office of the Deputy Assistant Secretary of the U.S. Navy for Energy (Aug. 7, 2013).
[35] RESOURCES FOR THE FUTURE, The Role of Oil in the U.S. Economy: Insights from a Veteran Observer, interview with Phil Sharp, President of Resources for the Future, http://www.rff.org/Publications/Resources/Pages/The-Role-of-Oil-in-the-US-Economy-177.aspx. (last visited Aug 12, 2013).
[36] DANIEL YERGIN, THE PRIZE: THE EPIC QUEST FOR OIL, MONEY & POWER 772 (1991).
[37] U.S. ENERGY INFORMATION ADMINISTRATION, ENERGY IN BRIEF (May 2013), *available at* http://www.eia.gov/energy_in_brief/article/foreign_oil_dependence.cfm.

as European nations sought to distance themselves from U.S. policies not favored by oil-exporting nations.

Since then, the U.S. has made it a foreign and defense policy imperative to prevent hostile powers from controlling the Persian Gulf oil-producing regions. President Carter, in his State of the Union Address on January 23, 1980, asserted:

> Let our position be absolutely clear: An attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America, and such an assault will be repelled by any means necessary, including military force.[38]

The Reagan Administration continued to pursue a policy of protecting the U.S.'s access to oil produced in the Middle East. President Reagan acknowledged that "Saudi Arabia and the other oil-producing nations in the region provide the bulk of the energy that is needed to turn the wheels of industry in the Western world." He added that, "There's no way we could stand by and see that taken over by anyone that would shut off that oil."[39] In the first sentence of his National Security Directive, President H.W. Bush stated "access to Persian Gulf oil and the security of key friendly states in the area are vital to U.S. national security."[40] The Clinton Administration affirmed the same line of reasoning; "Our paramount national security interest in the Middle East is maintaining the unhindered flow of oil from the Persian Gulf to world markets at stable prices."[41]

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[38]THE WHITE HOUSE, STATE OF THE UNION ADDRESS (1980), *available at* http://www.jimmycarterlibrary.gov/documents/speeches/su80jec.phtml.
[39] Steven R. Weisman, *Reagan Says U.S. Would Bar a Takeover in Saudi Arabia that Impeded Flow of Oil*, THE NEW YORK TIMES, October 2, 1981, *available at* http://www.nytimes.com/1981/10/02/world/reagan-says-us-would-bar-a-takeover-in-saudi-arabia-that-imperiled-flow-of-oil.html.
[40] THE WHITE HOUSE, NATIONAL SECURITY DIRECTIVE 26, (Oct.2, 1989), *available at* http://bushlibrary.tamu.edu/research/pdfs/nsd/nsd26.pdf.
[41] DEPARTMENT OF DEFENSE, UNITED STATES SECURITY STRATEGY FOR THE MIDDLE EAST (1995).

President G.W. Bush ordered the U.S. military into Kuwait after the 1990 invasion by Iraq, in large part, because it could have resulted in Iraq being the world's leading oil power, dominating the Persian Gulf and controlling the bulk of the world's oil reserves.[42] The 2003 invasion of Iraq, initially described as an effort to disarm weapons of mass destruction, has since been acknowledged by many to have been about oil.

> Of course it's about oil; we can't really deny that," said Gen. John Abizaid, former head of U.S. Central Command and Military Operations in Iraq, in 2007. Former Federal Reserve Chairman Alan Greenspan agreed, writing in his memoir, "I am saddened that it is politically inconvenient to acknowledge what everyone knows: the Iraq war is largely about oil." Then-Senator and now Defense Secretary Chuck Hagel said the same in 2007: "People say we're not fighting for oil. Of course we are."[43]

Oil disruptions, price spikes and supply interruptions have had a major impact on energy legislation over the past 40 years. The effects of the Yom Kippur War and the 1973 Arab Oil Embargo spurred the passage of the Energy Policy and Conservation Act of 1975[44] and the National Energy Policy Act of 1978[45] which mandated fuel efficiency standards for vehicles and required utilities to reduce the amount of oil used, respectively. The 1979 Iranian Revolution was followed by the Oil Windfalls Profits Tax and Energy Security Act of 1980.[46] The 1990 Iraqi invasion of Kuwait and the Gulf War drove the Energy Policy Act of 1992. The California Energy Crisis and Operation Iraqi Freedom was a trigger for the Energy Policy Act (EPAct) of 2005[47], which requires that the federal government draw at least seven and one-half percent of its electricity from renewable

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[42] YERGIN, *supra* note 36, at xiv, (epilogue copyright 2008).
[43] Antonia Juhasz, CNN, (April 15, 2013) http://www.cnn.com/2013/03/19/opinion/iraq-war-oil-juhasz.
[44] Energy Policy and Conservation Act, Pub. L. No. 94-163, 42 U.S.C. 6201 (1975).
[45] National Energy Conservation Policy Act, Pub. L. No. 95-619, 92 Stat. 3206 (1978).
[46] Energy Security Act, Pub. L. No. 96-294, 94 Stat. 611 (1980).
[47] Energy Policy Act, Pub. L. No. 109-58, 119 Stat. 594 (compiled in scattered sections of the U.S.C.) (2005).

sources beginning in 2013. In 2007, Executive Order 13423 required federal agencies to reduce energy intensity by three percent annually through 2015. [48]

As oil prices began to rise after 2003, there was a fear among oil consumers that demand from China and India would be so great that an oil shortage would result.[49] This fear was combined with actual production shutdowns in Venezuela and Nigeria which reduced supply, and oil went from 30 dollars a barrel at the beginning of the Iraq War to 145 dollars a barrel resulting, at least according to one observer, in "trillions of dollars flowed from oil-importing countries to the exporters- one of the greatest transfers of income in the history of the world.[50] These oil price increases lead to the Energy Independence and Security Act (EISA) of 2007 which raised CAFE standards from 27.5 miles per gallon to 30 miles per gallon for new cars by 2020.[51] EISA also requires federal agencies to reduce their energy use by 30 percent below their fiscal year (FY) 2003 baselines.[52] The concern about dramatic oil price increases and climate change contributed to the development of a bill named The American Clean Energy and Security Act of 2009, and although it was passed by the House in June 2009, it was not passed by the Senate.[53] In 2009, President Obama signed Executive Order 13514, which is aimed at improving the federal government's environmental sustainability. It set a 28 percent

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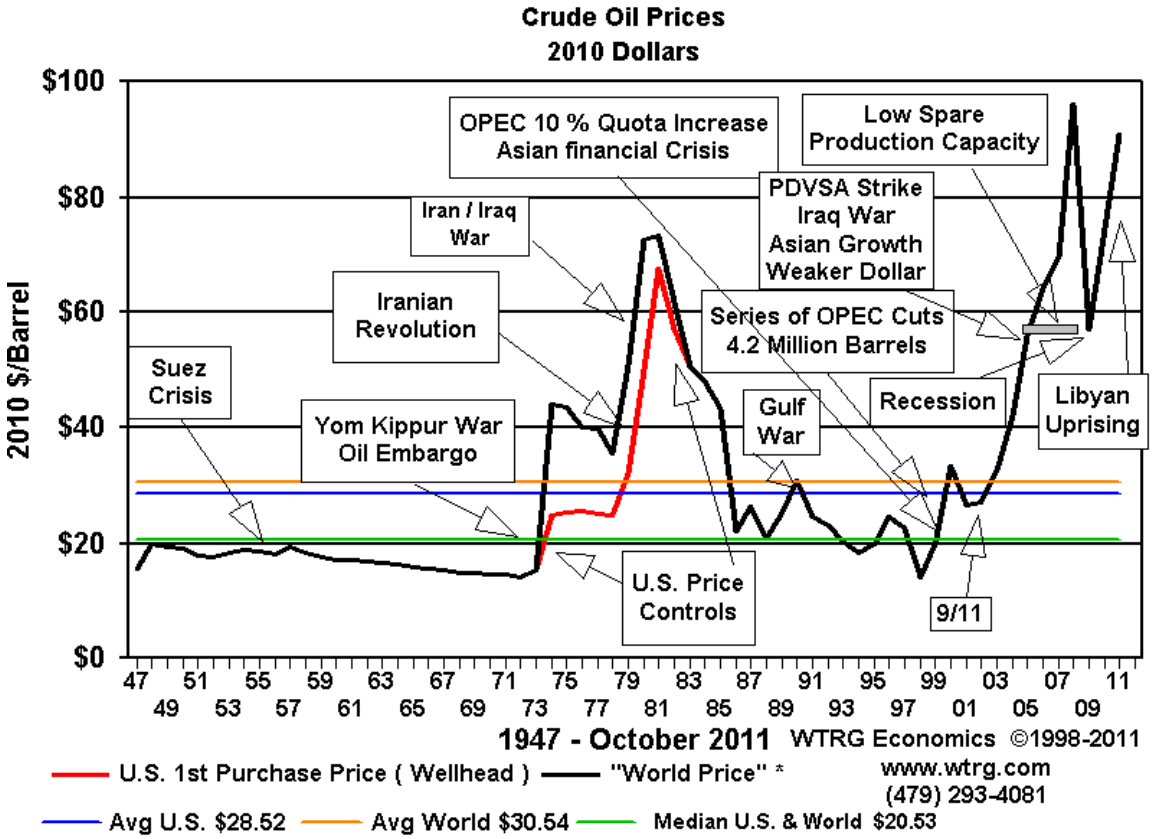
[48] Exec. Order No. 13423, 48 C.F.R. 970.5223-6 (2007).
[49] YERGIN, *supra* note 36, at 769.
[50] *Id.*
[51] Energy Independence and Security Act, Pub. L. No. 110-140, 121 Stat. 1492 (2007).
[52] *Id.*
[53] H.R. 2454, 111th Cong. (2009) *available at* http://www.govtrack.us/congress/bills/111/hr2454.

reduction target for government greenhouse gas emissions by 2020 with an estimated energy savings target of 8 billion dollars to 11 billion dollars.[54]

It is worth noting that the three longest U.S. recessions since the Great Depression have coincided with exceptionally high oil prices. The first started in November 1973 and the second started in July 1981 and both lasted 16 for months. The latest began in December 2007 and lasted for 18 months. The figure below depicts the relationship between the price of oil and significant events such as wars and recessions.




***Oil Price History and Analysis***
*Source:* ***James L. Williams, WTRG Economics***[55]

[54] Exec. Order No. 13514, Fed. Reg. Vol. 74, No. 194 (Oct. 8, 2009)
[55] James Williams, Oil Price History and Analysis, WTRG Economics, http://www.wtrg.com/prices.htm (last visited Aug. 1 2013).

These and other pieces of legislation demonstrate the long term and continuing concerns about the impact of energy issues on U.S. economic and national defense priorities. While there is nothing inherently wrong with passing legislation in response to world events, the U.S. has traditionally found itself in a reactionary position when it comes to maintaining our oil supply.

> The current model of energy security, which was born of the 1973 crisis, focuses primarily on how to handle any disruption of oil supplies from producing countries. Today, the concept of energy security needs to be expanded to include the protection of the entire energy supply chain and infrastructure—an awesome task."[56]

Most recently, in 2009, the Obama Administration acknowledged;

> Over dependence on imported oil—by the U.S. and other nations— tethers America to unstable and hostile regimes, subverts foreign policy goals, and requires the U.S. to stretch its military presence across the globe; such force projection comes at great cost and with great risks.[57]

This policy echoes the reasoning of the U.S. Navy's plan to improve energy security by increasing diversity of energy supply with the DPA Title III Advanced Drop-in Biofuels Production Project. Increased sources of energy will reduce the power the oil market has over the nation, because there will be alternatives to conventional oil. When oil prices increase, the effects on the U.S. economy will be reduced if all consumers have other options. Increased economic stability will decrease the need for a national strategy focused on preventing hostile powers from controlling the Persian Gulf oil-producing regions.

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[56] Daniel Yergin, *Ensuring Energy Security*, 85 FOREIGN AFF. 69, 78 (2006).
[57] CTR. FOR NAVAL ANALYSIS, POWERING AMERICA'S DEFENSE: ENERGY AND THE RISKS TO NATIONAL SECURITY (May 2009), *available at* http://www.cna.org/sites/default/files/Poweringpercent20Americaspercent20Defense.pdf.

### C. The Military and Human Cost of Reliance on Oil

The DOD's overall energy budget in 2012 was 16 billion dollars. In fiscal years 2011 and 2012, the DOD accrued 5.6 billion dollars in unanticipated fuel costs.[58] Then Secretary of Defense Robert Gates testified in 2011 that unbudgeted fuel costs cut Air Force flying hours, Navy steaming days, and training for Army personnel.[59] Instead of remaining reliant on foreign-sourced conventional petroleum products for energy, the U.S. needs to diversify its energy options, which will make the country less susceptible to violent increases in oil prices. The DOD's Operational Energy Strategy Implementation Plan, signals a shift towards a more realistic assessment of how to ensure energy security;

> More Options, Less Risk: Expand and Secure Energy Supplies for Military Operations. Reliance on a single energy source – petroleum – has economic, strategic, and environmental drawbacks. In addition, the security of energy supply infrastructure for critical missions at fixed installations is not always robust. The Department needs to diversify its energy sources and protect access to energy supplies to have a more assured supply of energy for military missions.[60]

With the need to access alternative energy sources officially recognized, the 2012 National Defense Authorization Act granted the Assistant Secretary of Defense for Operational Energy Plans and Programs the authority and responsibility over DOD alternative fuels policy.[61]

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[58] Defense Business Board, Re-examining Best Practices for DOD Fuel Acquisition, http://dbb.defense.gov/Portals/35/Documents/Reports/2011/FY11-6_Re-examining_Best_Practices_for_DoD_Fuel_Acquisition_2011-7.pdf

[59] Testimony on the Defense Authorization Request for Fiscal Year 2012 and the Future, Before the S. Comm. on Armed Services, 112th Cong. Sess. 1 (2011) (statement of Robert Gates, U.S. Secretary of Defense).

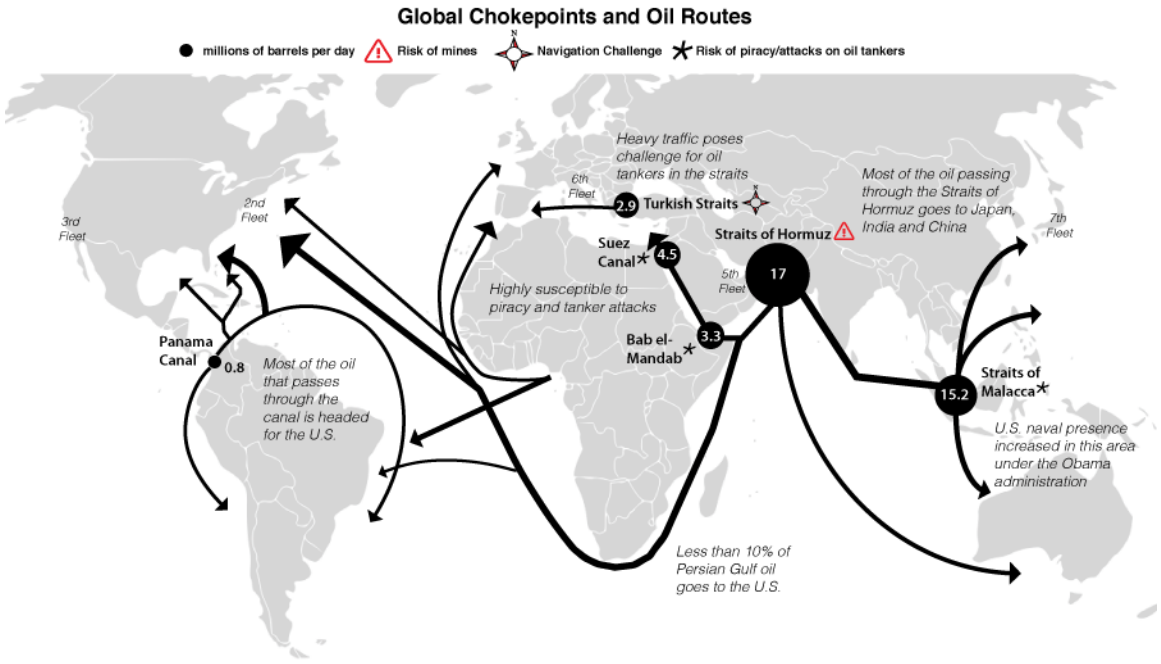
[60] DEPARTMENT OF DEFENSE, OPERATIONAL ENERGY STRATEGY: IMPLEMENTATION PLAN, *supra* note 5.

[61] National Defense Authorization Act for Fiscal Year 2013, Pub. L. No. 112-81, 125 Stat. 1298 (2011).

In addition to being reliant on oil to complete its mission, the U.S. Navy has been tasked to ensure the continued reliable transport of oil to preserve the global market. Since the end of World War II, the U.S. Navy has patrolled the world's oceans and kept sea lanes open for peaceful commerce and transport for our nation and her allies, although the benefits are reaped by all nations, including those with adverse interests. The EIA estimates that about half the world's oil is transported by sea, moving through a small number of chokepoints such as the Strait of Hormuz, Malacca, and Denmark; the Suez and Panama Canals; and the Bab-el-Mandeb at the southern end of the Red Sea.[62] The postwar and post-Cold War eras have seen the growth of asymmetric engagements and of terrorism by of non-state actors. Maritime chokepoints are ideal targets for rogue states and terrorists intent on causing political or economic disruption. These attacks make it more difficult to secure supply and transport of oil. The figure below depicts global chokepoints and oil routes worldwide.[63]

[62] U.S. ENERGY INFORMATION ADMINISTRATION, WORLD OIL CHOKEPOINTS (Aug. 22, 2012) http://www.eia.gov/countries/analysisbriefs/World_Oil_Transit_Chokepoints/wotc.pdf

[63] The National Security Reporting Project, Medill School of Journalism, Media, Integrated Marketing Communications at Northwestern University, http://oilchangeproject.nationalsecurityzone.org/choke-points/chokepoints-map-2/.




***Source: The National Security Reporting Project, Medill School of Journalism, Media, Integrated Marketing Communications at Northwestern University***

The mission to protect the flow of oil has included combat operations and the loss of U.S. lives. During the Iran-Iraq War, the U.S. Navy was tasked to protect Kuwaiti oil tankers transporting oil from Iraq. During the Persian Gulf War, the U.S. military protected the border of Saudi Arabia from Iraqi aggression after Iraq invaded Kuwait. As a part of Operation Iraqi Freedom, Iraq's oil infrastructure was protected by U.S. military forces. Navy Sailors were tasked to protect Iraq's two critical oil platforms, living on them for six months at a time.[64]

[64] *Iraq Boat Attack Kills Two U.S. Sailors*, USA TODAY, April 4, 2004. In 2004, two U.S. Navy Sailors were killed while defending the Khawr Al Amaya (KAAOT) oil terminal from a suicide bomber who approached the oil platform.

Total flows through the Strait of Hormuz in 2011 were roughly 35 percent of all seaborne traded oil, or almost 20 percent of oil traded worldwide.[65] Most of the oil exported from the Persian Gulf today is going to Japan, China, India, and South Korea, but none of those countries has any substantial military presence in the Persian Gulf.[66] Instead, they rely on the United States to protect the free flow of oil.[67] Roger Stern, professor at the University of Tulsa National Energy Policy Institute, estimated that the U.S. had spent eight trillion dollars ensuring the flow of oil cargos through the Persian Gulf since 1976, despite the fact that only 10 percent of the oil passing through was destined for the U.S. [68] A study conducted by the RAND Corporation in 2009 estimated that the DOD spent between 86 and 104 billion dollars per year maintaining oil security in the Middle East.[69] Those estimates, of course, cannot take into consideration the loss of life suffered by service members involved in operations related to oil security. However, they do illustrate the enormous amount of resources that the U.S. has put into

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[65] U.S. ENERGY INFORMATION ADMINISTRATION, *The Strait of Hormuz is the world's most important oil transit chokepoint* (Jan. 4, 2012) http://www.eia.gov/todayinenergy/detail.cfm?id=4430

[66] Indira A.S. Lakshmanan, Gopal Ratnam, *China Gets Cheaper Iran Oil as U.S. Pays for Hormuz Patrols*, BLOOMBERG , Jan. 12, 2012, http://www.bloomberg.com/news/2012-01-12/china-gets-cheaper-iran-oil-as-u-s-pays-tab-for-hormuz-patrols.html.

[67] *Id.* "The U.S. is bearing most of the cost of air and sea patrols and surveillance in the Strait of Hormuz, through which transit 17 million barrels a day of crude, or 20 percent of world supplies. China, the No. 2 importer of oil after the U.S., enjoys protection for the shipping lanes without paying a cent." Admiral Dennis Blair (USN, ret.), former U.S. Director of National Intelligence.

[68] R.J. Stern, *United States cost of military force projection in the Persian Gulf, 1976–2007*, ENERGY POLICY (2010).

[69] KEITH CRANE, ANDREAS GOLDTHAU, MICHAEL TOMAN, THOMAS LIGHT, STUART E. JOHNSON, ALIREZA NADER, ANGEL RABASA, HARUN DOGO, IMPORTED OIL AND U.S. NATIONAL SECURITY (2009) (RAND CORPORATION, INFRASTRUCTURE, SAFETY, AND ENVIRONMENT AND NATIONAL SECURITY RESEARCH DIVISION), at 63 *available at* http://www.rand.org/pubs/monographs/2009/RAND_MG838.pdf.

maintaining the flow of oil from the Persian Gulf countries. In 2012, then Secretary of Defense Leon Panetta announced that resources once committed to the Persian Gulf will soon be rebalanced, "By 2020 the U.S. Navy will re-posture its forces from today's roughly 50-50 split from the Pacific and Atlantic to a 60-40 split in those oceans."[70] While the U.S. Navy may have a reduced presence in the Middle East in the ensuing years, it will simply be re-positioned to the Pacific. Therefore, it will have a continued, if not increased, need for energy.

U.S. dependence on imported oil has declined since peaking in 2005.[71] In 2012, the U.S. still imported 20 percent of its petroleum from Persian Gulf Countries.[72] The trend is expected to continue, as the U.S. develops conservation strategies, new technologies increase the yield from our domestic supply, and there is an increase in production shale oil and natural gas.[73] While this is a positive trend, the mere fact that less of the oil the U.S. uses comes from the Middle East will not create energy security. Instead, the amount of oil used must be reduced, though diversification of energy sources.

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[70] Liz Neisloss, *U.S. Defense Secretary Announces New Strategy with Asia*, CNN, June 2, 2012, http://www.cnn.com/2012/06/02/us/panetta-asia."The South China Sea, nicknamed "the second Persian Gulf" because of its potential for massive oil and gas reserves, is also a key passageway for the world's oil and is home to enormously valuable fisheries. A crisis in the area has the potential for major economic damage to the United States as well. As one of the busiest sea lanes in the world, disputes in the South China Sea could have a major impact on shipping by forcing costly rerouting."

[71] U.S. ENERGY INFORMATION ADMINISTRATION, U.S. Oil Import Dependence: Declining no matter how you measure it (May 25, 2011), http://www.eia.gov/oog/info/twip/twiparch/110525/twipprint.html.

[72] U.S. ENERGY INFORMATION ADMINISTRATION, How much petroleum does the United States import and from where? (June 2013), http://www.eia.gov/tools/faqs/faq.cfm?id=727&t=6.

[73] INTERNATIONAL ENERGY OUTLOOK 2013, *supra* note 8.

As noted earlier, the U.S. Navy proposes to reduce dependence on conventional petroleum by diversification of its energy sources. Maintaining energy security through diversification is hardly a new concept: Winston Churchill stated that "Safety and certainty in oil lie in variety and variety alone."[74] However, while diversifying the nation's energy supply will certainly improve energy security, the reality of the global oil market cannot be ignored. There is only one worldwide oil market, therefore secession is not an option. For the U.S., and all consumers, security also resides in the stability of the market.[75] Therefore, the development of alternate energy sources will not obviate the need to protect the supply and transportation routes for oil. However, there are compelling reasons for the U.S. Navy to work towards establishing a viable advanced drop-in biofuel industry. If the U.S. is better prepared to weather interruptions in the flow of conventional oil, it has less reason to send troops into harm's way. While it is impossible to completely eliminate the need for imports, reduced dependence on oil will reduce the power the market has over the U.S.'s economy and foreign policy, and the resulting financial costs. A report from the Defense Science board stated, "the payoff to DOD from reduced fuel demand in terms of mission effectiveness and human lives is probably greater than for any other energy user in the world."[76] The U.S. Navy, as a consumer of petroleum, has developed the DPA Title III Advanced Drop-in Biofuels Production Project as a way to diversify its energy sources and therefore increase energy security.

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[74] *Id.* at 69.
[75] *Id.* at 76.
[76] DEFENSE SCIENCE BOARD, More Fight – Less Fuel, Report on the Defense Science Board on DOD Energy Strategy (Feb. 2008), http://www.acq.osd.mil/dsb/reports/ADA477619.pdf

## III. Utilization of the Defense Production Act

The federal government has a long history of providing financial support to industries which are critical to national defense. The Defense Production Act of 1950 (DPA), as amended, grants the President "an array of authorities to shape national defense preparedness programs and take appropriate steps to maintain and enhance the domestic industrial base."[77] "National defense" is defined as "programs for military and energy production or construction, military or critical infrastructure assistance to any foreign nation, homeland security, stockpiling, space and any directly related activity."[78]

The intent of the DPA therefore is not only to provide for military preparedness and capabilities, but also to ensure that there will be sufficient domestic preparedness and response. The DPA is an appropriate vehicle to encourage the development of a domestic advanced drop-in biofuel industry because the DPA designates energy as a "strategic and critical material" and the project will increase energy security by providing diversity of energy supply.

This section discusses the historical uses of the DPA and describes how the provisions and authorizations may be used. It examines the use of the DPA for energy infrastructure projects, specifically the reasoning for the development and early termination of the Synthetic Fuels Corporation. It points out that the lesson to be learned from the SFC case is that the nation has a history of being unable to sustain interest (and funding) for alternative energy sources when faced with ready access to conventional oil products. The Navy's history as an energy first adopter is detailed, and the section

[77] DEFENSE PRODUCTION ACT, 50 U.S.C. Appx. §2062(a)(4).
[78] DEFENSE PRODUCTION ACT, 50 U.S.C. Appx. §2152(14).

concludes with why that history makes the Navy ideally suited to be a first adopter of biofuels.

The First and Second War Powers act of 1941 and 1942 gave the executive branch authority to reorganize and regulate industry during World War II.[79] The Act and all changes were to remain in effect until six months after the end of the war.[80] In the 1940s, the Cold War with the Soviet Union and the 1950 invasion of South Korea by North Korea prompted President Truman to re-consider the need for the executive branch to have the ability to expand defense production capacity (specifically the steel, aluminum, copper, and titanium industries) and he pushed Congress to pass the Defense Production Act.

> It is urgently necessary that the Congress act on the Defense Production Bill without delay. If this measure is enacted promptly, we can do a great deal to ease the economic adjustments which our defense effort will require. At the same time, we can continue, on an expedited but careful basis, our planning and preparation for other economic controls, if and when needed.[81]

As enacted on September 8, 1950[82] the original DPA contained seven titles which authorized the President to shape the nation's economy:

> Title I: Priorities and Allocations (authority to demand priority for defense related products)
>
> Title II: Authority to Requisition (authority to requisition materials, property, and facilities for national defense; terminated in 1953)

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[79] First War Powers Act, 1941 (H.R. 6233, Pub. .L. 77-354, 55 Stat. 838), and Second War Powers Act, 1942 (S. 2208, Pub .L. 77-507, 56 Stat. 176).
[80] *Id.*
[81] Letter from President Harry S. Truman to Committee Chairmen on the Defense Production Bill, (Aug.1, 1950) *available at* http://www.trumanlibrary.org/publicpapers/index.php?pid=834&st=defense+production+act&st1=.
[82] DEFENSE PRODUCTION ACT , 50 U.S.C. App. 2061, et seq., Pub. L. 81-774, 64 Stat. 789.

> Title III: Expansion of Productive Capacity and Supply (authority to provide incentives to develop, modernize, and expand defense productive capacity)
>
> Title IV: Price and Wage Stabilization (authority to ration consumer goods, to solicit voluntary labor/industry cooperation on wage and price stability, and to fix wage and price ceilings; terminated in 1953)
>
> Title V: Settlement of Labor Disputes (authority to force settlement of labor disputes affecting national defense; terminated in 1953)
>
> Title VI: Control of Consumer and Real Estate Credit (authority to exercise consumer credit controls, to regulate real estate construction credit and loans, and to establish down-payment requirements on veterans' homes; terminated in 1953)
>
> Title VII: General Provisions (antitrust protection for voluntary industry agreements serving defense interests, and established a voluntary reserve of trained private sector executives available for emergency federal employment, among other authorities).[83]

The DPA includes a sunset provision that requires reauthorization and the opportunity for amendment. Congress has reauthorized the DPA 51 times since 1950, most recently on September 30, 2009, and it expires on September 30, 2014.[84]

In the latest re-authorization of the DPA, in 2009, Congress broadened the definition of national defense to include critical infrastructure assistance to foreign nations and included homeland security.[85] Of the seven original Titles, three remain-Titles, I, III and VII. Title I, the priority performance authority, grants the federal government, in the interest of national defense, the authority to ensure the ready availability of privately created critical materials, equipment, and services.[86] The government receives priority in contracting for those goods and services, but this provision does not apply to employment contracts and private persons are not required to

[83] 50 U.S.C. App. § 2061 et seq.
[84] *Id.*
[85] 50 U.S.C. Appx. § 2152, Pub. L. 111-67, 123 Stat. 2017.
[86] 50 U.S.C. Appx. § 2071(a); Section 101(a).

participate in the development of chemical or biological weapons.[87] The DOD utilized Title I to support the development of engineering specifications to qualify new materials in defense applications.[88]

Title I also contains provisions related to energy, in particular Section 10(c) which authorizes the President to allocate or prioritize contracts for materials, equipment, and services in order to maximize domestic energy supplies which are scarce, critical and essential;

> (i) To maintain or expand exploration, production, refining, transportation;
> (ii) To conserve energy supplies; or
> (iii) To construct or maintain energy facilities; and
>
> (B) maintenance or expansion of exploration, production, refining, transportation, or conservation of energy cannot reasonably be accomplished without exercising the authority specified.[89]

Section 106 of Title I designates energy as a "strategic and critical material" which enables Title III authorities, discussed below.

Title III has traditionally been used to address Government-wide or large platform industrial base issues that are beyond the capabilities of individual agencies or programs to rectify and is useful as a tool to directly address industrial production shortfall issues.[90]

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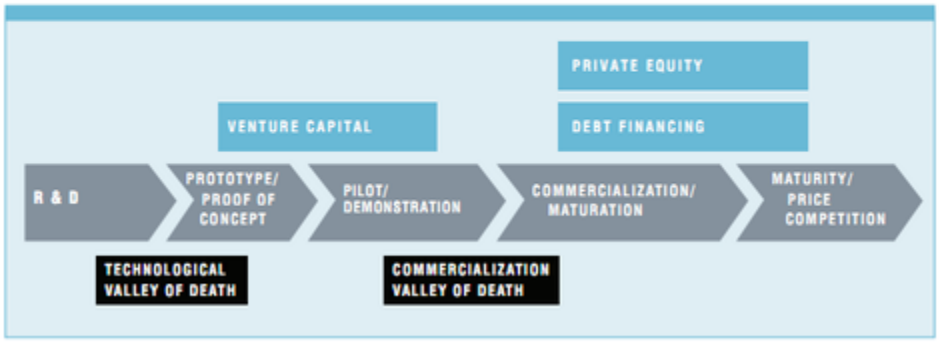
[87] 50 U.S.C. Appx. § 2074; Section 104.
[88] DEFENSE PRODUCTION ACT TITLE III COMMITTEE, Portfolio of Projects, Including the M1 Abrams Main Battle Tank, lithium ion batteries, titanium metal composite, microprocessors, miniature compressors for electric cooling, low-cost military GPS, titanium powder production, and high quality beryllium production. http://www.dpatitle3.com/dpa_db/landing_search.php (last visited Aug. 1, 2013).
[89] 50 U.S.C. Appx. § 2071; Section 101.
[90] J. Michael Littlejohn, *Using All the King's Horses for Homeland Security: Implementing the Defense Production Act for Disaster Relief and Critical Infrastructure Protection*, 36 Pub. Cont. L.J (2006).

It requires no intermediaries and the Title III investments are injected directly into the industrial base. Therefore, it provides a bridge from research and development to affordable, volume production and prevents the phenomenon known as the "valley of death."[91]

**Figure 1**

**THE ENERGY INNOVATION CYCLE AND THE CLEAN ENERGY VALLEYS OF DEATH**




***Source: The Breakthrough Institute*[92]**

Section 303 of Title III authorizes the President to create, maintain, protect, expand, or restore domestic industrial base capabilities essential to the national defense.[93] The authorities include:

1. Purchasing or making purchase commitments of industrial resources or critical technology items
2. Making subsidized payments for domestically produced materials; and

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[91] Christopher Head, *Venture Capital's Role in Clean Energy Innovation*, AMERICANS FOR ENERGY LEADERSHIP (Dec 9, 2010) http://leadenergy.org/2010/12/venture-capitals-role-in-clean-energy-innovation/. The Valley of Death is the point where a technology has advanced to the "proof of concept" phase and is beginning the expensive process of mass production and significant sales. Unfortunately, these investments are many times too risky for the major lenders on Wall Street, and too expensive for Silicon Valley VCs. This is the point where many promising startups inevitably falter and fold, hence the name "Commercialization Valley of Death."

[92] Jesse Jenkins and Sara Masur, *Bridging the Clean Energy Valleys of Death*, THE BREAKTHROUGH INSTITUTE, (Nov. 2011) http://thebreakthrough.org/blog/Valleys_of_Death.pdf.

[93] 50 U.S.C. Appx. § 2093, Section 303.

3. Installing and purchasing equipment for industrial facilities to expand their productive capacity.[94]

Thus, Section 303 authorizes the President to provide incentives for domestic private industry to produce critical resources necessary for the national defense. In order to use Section 303 authorities, the president must determine that there is a "domestic industrial base shortfall"[95] for a particular resource which threatened the national defense. The President also has to find that the industry cannot reasonably be expected to provide the capability in a timely manner.[96] Executive Order 13603 authorities the "head of each agency engaged in procurement for national defense" to exercise the authorities of Sections 301, 302, and 303 of Title III of the DPA.[97] The DPA Title III establishes the Defense Production Act Fund, which can be drawn from until all funds are expended.[98]

Title VII contains provisions that specify how DPA authorities may be used and includes; special preference for small businesses, allowance for voluntary agreements between competing private industry parties, National Defense Executive Reserve, Committee on Foreign Investment in the United States, Defense Production Act Committee, and requires the Secretary of Commerce to prepare an impacts of offsets report regarding defense preparedness.[99] The authorization of funds for the DPA is made in the DOD appropriations bill to the DPA Fund.

The utility of the DPA was proven early on by its use to develop the aluminum and titanium markets in the U.S. in order to support the Korean War. Prior to 1950,

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[94] 50 U.S.C. Appx. § 2093(c), Section 303(c).
[95] 50 U.S.C. Appx. § 2093(c), Section 303(a)(5).
[96] 50 U.S.C. Appx. § 2093(a)(5)(B), Section 303(a)(5)(B).
[97] Exec. Order No. 13603, Federal Register Vol. 77, No. 56 (2012).
[98] 50 U.S.C. Appx. § 2094; Section 304.
[99] 50 U.S.C Appx. § 2151 et seq.

aluminum and titanium markets were virtually nonexistent, but the development of new aircraft required these two materials.[100] As consumer demand grew during the postwar prosperity, the range of applications increased accordingly. Use of aluminum building products in commercial and residential construction expanded, and aluminum foil became a staple of the American kitchen.[101] Most recently, DPA Title III authorities have been used to fund number of large-scale actions to create or expand domestic production capabilities for materials and technologies essential to military success including the M1 Abrams battle tank, lithium ion batteries, titanium metal composited, microprocessors, miniature compressors for electronic cooling, low-cost global positioning systems, beryllium production, and renewable energy sources.[102] The Defense Production Act Title III Biofuel Initiative has the potential to do for biofuels what it did for aluminum, making them something that the average U.S. consumer uses on a daily basis.

### A. Energy Under the DPA

Energy is designated in Title I as a "strategic and critical material."[103] However, before 2009 the DPA did not give the President any authority to engage in the production of energy "except as expressly provided in sections 305 and 306 for synthetic fuel production which were used to support the creation of the Synthetic Fuels

[100] 50 U.S.C Appx. § 2191 et seq.
[101] U.S. DEPARTMENT OF ENERGY, Aluminum Executive Summary, http://www1.eere.energy.gov/manufacturing/resources/aluminum/pdfs/techpartners.pdf, (last visited Aug.1, 2013).
[102] DEFENSE PRODUCTION ACT TITLE III COMMITTEE, Portfolio of Projects, *supra* note 87.
[103] 50 U.S.C. Appx. § 2076; Section 106.

Corporation."[104] In 2009, Congress eliminated the restriction. At that time, Congress also amended the "Declaration of Policy" to include renewable energy sources "biomass" and "more efficient energy storage and distribution technologies" to augment the domestic industrial base.[105] Previous defense related fuels programs have included the U.S. Navy Petroleum and Oil Reserves Set Aside, the Liquid Synthetic Fuels Development, and the Strategic Unconventional Fuels Commercial Development.

The current renewable fuels standard in the U.S. originally appeared in the 2005 Energy Policy Act, which mandated the production of ethanol from cornstarch through the Renewable Fuels Standard.[106] In 2007, this standard was updated under Title II ("Energy Security through Increased Production of Biofuels") of the Energy Independence and Security Act (EISA) to create a renewable fuels standard known as RFS2.[107] This standard sets targets for U.S. consumption of renewable fuels by type from 2008 to 2022 that rise over time. By 2022, the target for total biofuel consumption is 36 billion gallons per year. Corn ethanol can contribute a maximum of 15 billion gallons with the balance made up of advanced biofuels.[108] The 2022 minimum mandates for advanced biofuels are one billion gallons for biomass-based diesel, 16 billion gallons for cellulosic fuels, and four billion gallons from undifferentiated advanced biofuels.[109]

The biofuel initiative is not the first government-industry fuel partnership. In response to Nazi efforts to create synthetic fuel, Congress passed in 1944 the Liquid

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[104] 50 U.S.C. Appx. § 2076(2).
[105] 50 U.S.C. Appx. § 2062(a)(6); Section 2(a)(6).
[106] Energy Policy Act, *supra* note 48.
[107] Energy Independence and Security Act, *supra* note 52.
[108] Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program, 75 Fed. Reg. 14670, 14746 (Mar. 26, 2010).
[109] 42 U.S.C. 7545(o)(2)(B)(i)(II).

Synthetic Fuels Act, authorizing 30 million dollars (nearly 392 million in 2012 dollars) to build synthetic fuel demonstration plants.[110] The act authorized the Secretary of the Interior to construct and operate plants which would convert coal, oil shale and agricultural products into synthetic liquid fuel to aid the U.S. in World War II. The United States paid 58 dollars per barrel for that fuel, far above the petroleum market price at the time.[111] Over the next decade, the government invested 87 million dollars (750 million in 2012 dollars) in alternative fuel.

In 1980, against the backdrop of the Iranian Revolution and skyrocketing oil prices, President Carter signed the Energy Security Act into law.[112] In an effort to take advantage of the nation's large reserves of coal and oil shale, Congress created the Synthetic Fuels Corporation (SFC) an independent, federally-owned corporation.[113] Private companies were unable to take on the risks associated with unanticipated operating problems and the construction of plants large enough to operate at a commercial scale. Setting national goals for synthetic fuel production, the Act authorized the SFC to provide various financial incentives in order to meet those goals.[114] Congress planned to run the corporation with 88 billion dollars throughout the planned existence (1980-1992) and expected it to produce 500,000 barrels of oil a day of synthetic fuels by

[110] RALPH BRAYRER, THE SAGA OF THE U.S. SYNTHETIC FUELS CORPORATION: A CAUTIONARY TALE (2011).
[111] *Id.*
[112] Energy Security Act, *supra* note 48.
[113] *Id.* at § 115, 42 U.S.C. 8711.
[114] BRAYRER, *supra* note 110, at notes 149-72 infra.

1987 and two million barrels a day by 1992.[115] However, in 1985, Congress terminated the corporation.

There are conflicting theories as to why the SFC was terminated early. The RAND Corporation conducted an analysis, finding;

> Our examination of the oil sands experience suggests that there was a clear and explicit failure to learn. The major difficulties with the first plant were not related to the quality of engineering but rather were unanticipated problems associated with new technology, feedstock, uncertainty, and severity of the climate.[116]

However, according to a former officer of the SFC, the failure of the SFC can be attributed to "a fall in oil imports (however temporary), a decline in gasoline prices (also temporary), and waning public interest."[117] In a House debate regarding the future of the SFC, the arguments supporting the continued existence of the project included the:

1. value of having proven alternative sources of energy for enhanced national security,
2. long lead time required to develop synthetic fuels technologies,
3. continued vulnerability of the U.S. to interruption of imports, and
4. detrimental effect of cancelling a project which called for a large governmental and private investment, just a few years after the fact.[118]

Opponents who successfully argued for its demise argued asserted that the company was;

1. poorly managed;
2. slow to award contracts;
3. premature because the technologies were not ready for commercial development;
4. contributing to the budget deficit, and

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[115] *Id.* at notes 181-84 infra.
[116] R.W. Hess, A Rand Note, Potential Production Cost Benefit of Constructing and Operating First-Of-A-Kind Synthetic Fuel Plants, p. 41 (March 2005), *available at* http://www.rand.org/content/dam/rand/pubs/notes/2005/N2274.pdf
[117] BRAYRER, *supra* note 110, at 3.
[118] *Id.* at 06.

5. alone would not provide national energy security.[119]

The lesson to be learned from the SFC case is that the nation has a history of being unable to sustain interest (and funding) for alternative energy sources when faced with ready access to conventional oil products. Moreover, when the issue becomes politicized, the complex issues are often reduced to sound bites which fail to reflect the true ramifications of withdrawing government support. For instance, even though the Pentagon has never requested it, Republican lawmakers have repeatedly tried to repeal Section 526 of the Energy Independence and Security Act , which prohibits federal agencies from contracting for fuels that release more carbon pollution than conventional petroleum. As recently as June 2013, Senators John Barrasso (R-WY) and Joe Manchin (D-WV) tried to lift restrictions on military purchases of liquid coal and oil sands fuels, which are cheaper but far dirtier than standard engine fuels.[120] The Republicans argue that Section 526 reduces national security because it prevents the U.S. from purchasing oil from our ally, Canada. However, Thomas Hicks, the deputy assistant secretary of the Navy for Energy called Section 526 an effective policy tool and testified to the House Subcommittee on Energy and Power that "the more we replace foreign sources of oil with more diverse, domestically produced alternative fuels, the better we are as a military and the better we are as a nation."[121]

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[119] *Id.*

[121] Testimony on a Department of the Navy Perspective on Alternative Fuels, Before the H. Subcomm. on Energy and Power (June 3, 2011) (Statement of Mr. Tom Hicks, Deputy Assistant Secretary of the Navy for Energy).

### B. Navy as an Energy First Adopter

The U.S. Navy has a tradition of energy innovation, going back to the 19th century, made possible with financial support from the federal government. As new energy sources and materials became available, financing from the government ensured each new industry matured in order to support the military's needs. The transition from sail to steam was delayed because the added cost of coal over sails meant that coal-powered steam was used only intermittently. At the beginning of the 20th century, following the suggestion of the Naval strategist Alfred Thayer Mahan, the U.S. secured a network of naval bases, including Guam, Guantanamo Bay, Hawaii and Puerto Rico, capable of providing coal and supplies to the U.S. Navy.[122] This acquisition enabled the launching of the Great White Fleet by President Theodore Roosevelt in 1907.[123] The Great White Fleet consisted of 16 battleships and was manned by over 14,000 Sailors and Marines who sailed around the world in a show of force by the coal-powered steam battleships built of steel. Notably, the Great White Fleet was only possible after years of subsidies, loans, and protective tariffs had the ensured the maturation of the U.S. steel industry. In the 1890s, when the U.S. Navy was building its first four steel ships, it paid nearly double the going price of cheaper European steel to support domestic steelmakers. The government's belief that it was unacceptable to rely on foreign steel for our warships helped boost American steel to lead the world, driving our rise in the 20th century as an industrial, military, and political power.

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[122] *See,* U.S. DEPARTMENT OF STATE, OFFICE OF THE HISTORIAN, Mahan's The Influence of Sea Power upon History, http://history.state.gov/milestones/1866-1898/Mahan.

[123] *See*, DEPARTMENT OF THE U.S. NAVY-NAVAL HISTORY AND HERITAGE COMMAND, The Great White Fleet, http://www.history.U.S. Navy.mil/faqs/faq42-1.htm.

Soon thereafter, the U.S. Navy made the conversion from coal to oil-burning ships. In response to concerns that the nation must ensure a steady supply of oil in times of national emergency, Congress passed the Pickett Act of 1919, which authorized the president to control potential oil-bearing lands in California, Wyoming, and later in Alaska as the National Petroleum Reserves. Once again, the federal government found it in the nation's interest to secure energy for the use of the military.

More recently, the U.S. Navy was a first adopter of nuclear power, and launched the USS Nautilus, the first nuclear-powered submarine, in 1955.[124] Originally, the federal government tried to induce private industry to develop power reactors jointly with government, planning to eventually step out of the projects and have private companies assume total financial responsibility for commercial profit and also for any liability. However, lower than expected growth of the commercial nuclear industry led to the 1957 enactment of the Price-Anderson Act, which placed a cap on liability for nuclear accidents at commercial power plants. Thus, throughout the U.S. Navy's history, its willingness to be a first adopter of new energy has been supported, and made possible only by federal financial incentives and support.

The U.S. Navy's utilization of the DPA to diversify its energy sources will accelerate availability of the emerging technology years ahead of "normal" availability. Since the funding process under the DPA is more efficient than traditional procurement processes, it can result in reduced costs. Lastly, it maintains secure domestic sources

[124] SUBMARINE FORCE MUSEUM, HOME OF HISTORIC SHIP NAUTILUS, History of USS Nautilus (SSN 571), http://www.ussnautilus.org/nautilus/.

rather than potentially unreliable foreign sources, strengthens the economic and technological competitiveness of the U.S. industrial base, and creates U.S.-based jobs.

## IV. The DPA Title III Advanced Drop-in Biofuels Production Project

Use of the DPA is justified to aid in the development of a domestic advanced drop-in biofuel industry within the context of the current costs of continued reliance on oil, and the established practice of the federal government to provide subsidies in order to develop industries which contribute to military effectiveness. The use of the DPA to develop the biofuel industry will help the nation achieve energy security by providing diversity of energy supply to the military and the nation. This section describes Title III authorities and how they can be used as a result of the federal government's growing support for alternative sources of energy. The Navy's Great Green Fleet demonstration is discussed, both in terms of its successes and criticisms, including the legislative debate over the biofuel initiative. This section contains an explanation of the different pathways for the development of biofuels. The aviation industry's biofuel program is explained, as it is another potential customer for the biofuel industry. Finally, the benefits of long-term contracting and hedging for alternative fuels are explored.

Title III authorities may be used by the President to ensure that the nation has an adequate supply of, or ability to produce, essential materials and goods necessary for the national defense. The President may provide financial incentives to develop, maintain, modernize, restore, and expand the production capacity of domestic sources for critical components, critical technology items, materials, and industrial resources essential for the

execution of the national security strategy of the United States.[125] The President is further authorized to ensure that critical components, critical technology items, essential materials, and industrial resources are available from reliable sources when needed to meet defense requirements during peacetime, graduated mobilization, and national emergency. [126] The President has delegated his priority and allocation authority to the Department of Defense, the Department of Homeland Security, and the Department of Energy according to resources required.[127] The Defense Production Act Committee comprised of heads of federal agencies and serves as a forum to "identify risks and shortfalls in the industrial base and make recommendation on actions to rectify them, including the use of DPA Title III authorities." [128]

> Title III authority is especially appropriate for small companies lacking the capital needed to bring a good idea to market, a situation some have termed the Valley of Death. A promising new technology is developed and demonstrated for a customer. The customer wants to buy, but is unwilling to commit to a product that has yet to be produced in volume. The supplier wants to sell, but is either unwilling or unable to commit to the investment needed to establish production. Neither customer nor supplier can accept the risk they've been asked to take. As a result, the technology gets caught in limbo between development and production, and nobody wins.[129]

The 2009 Duncan Hunter National Defense Authorization Act authorizes Department of Defense (DOD) to procure alternative fuels for military operations. In his

[125] 50 U.S.C. Apx. § 2077; Section 107.
[126] *Id.*
[127] Exec. Order No. 13603, *supra* note 97.
[128] DEFENSE PRODUCTION ACT TITLE III, COMMITTEE http://www.dpatitle3.com/dpa_db/dpac.php (last visited Aug. 1 2013).
[129] Rich Mirsky, *Trekking Through That Valley of Death*, INNOVATION (June/July 2005), *available a*t http://www.innovation-america.org/trekking-through-valley-death-defense-production-act.

2012 National Security Strategy, President Obama advocated for the development of domestically produced alternative energy.

As noted earlier, the DOD is the largest single consumer of energy in the world.[130] In 2011, the DOD purchased nearly 5 billion gallons of fuel at a direct cost of over 15 billion dollars to conduct worldwide military operations.[131] Recently, there has been a shift in both rhetoric and policy at the highest levels of military planning and strategy regarding energy issues. The DOD has realized that energy and climate change have direct impact on national security and strategic mission readiness.[132] Therefore, the DOD has found that implementation of efficiency measures and renewable energy sources will increase energy security.[133] The U.S. Navy has taken the lead in this charge, instituting the most ambitious energy goals of all the services. The Secretary of the U.S. Navy, Ray Mabus, has stated that energy is a "strategic resource" fundamental to the U.S. Navy's mission.[134]

> From a strategic perspective, the objective is to reduce reliance on fossil fuels. Tactically, the objective is to use energy sources available on location and

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[130] *See* Peter W. Singer, *Fueling the "Balance": A Defense Energy Strategy Primer*, BROOKINGS INST. (August 2009) http://www.brookings.edu/research/papers/2009/08/defense-strategy-singer, Bryan Walsh, *Blue Water, Green Fleet*, TIME (July 19, 2011), http://www.time.com/time/health/article/0,8599,2083965,00.html.

[131] ASSISTANT SECRETARY OF DEFENSE FOR OPERATIONAL ENERGY PLANS AND PROGRAMS, Addressing Fuel Logistics in the Requirements and Acquisition Processes (Oct. 18, 2012), http://energy.defense.gov/Reports/tabid/3018/Article/3496/addressing-fuel-logistics-in-the-requirements-and-acquisition-processes.aspx.

[132] DEPARTMENT OF DEFENSE, Quadrennial Defense Review report (Feb. 2010) *available at* http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf.

[133] DEPARTMENT OF DEFENSE, OPERATIONAL ENERGY STRATEGY: IMPLEMENTATION PLAN, *supra* note 5.

[134] SECRETARY OF THE U.S. NAVY, ENERGY GOALS, *available at* http://greenfleet.dodlive.mil/energy/.

> increase energy efficiency to reduce the vulnerability that is often associated with long fuel supply transport limes and increase operational capacity.[135]

Secretary Ray Mabus, set forth five alternative energy goals in 2010, which are "energy efficient acquisition, sailing the "great Green Fleet" on non-fossil fuels by 2016, reduce non-tactical petroleum use, increase alternative energy ashore, and increase alternative energy use DON-wide."[136] One of Secretary Mabus' five energy goals is to increase alternative energy use DoN-wide: he has stated that by 2020, 50 percent of total energy consumption will come from alternative sources.[137] A second goal is to deploy a "Great Green Fleet," by 2016, a Carrier Strike Group fueled by alternative sources of energy, including nuclear power.[138] The U.S. Navy conducted a demonstration of the Great Green Fleet from July 19-20, 2012 during the 2012 Rim of the Pacific (RIMPAC) exercise, the world's largest international maritime exercise.[139] The USS NIMITZ (CVN 68) and Carrier Air Wing ELEVEN, along with USS CHAFEE (DDG 90), USS CHUNG

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[135] *Id.*
[136] U.S. NAVY, A U.S. NAVY ENERGY VISION FOR THE 21ST CENTURY (Oct. 2010), *available at* http://greenfleet.dodlive.mil/files/2010/10/U.S. Navy-Energy-Vision-Oct-2010.pdf.
[137] SECRETARY OF THE U.S. NAVY, ENERGY GOALS 1.Energy Efficient Acquisition: Evaluation of energy factors will be mandatory when awarding Department of the U.S. Navy contracts for systems and buildings. 2. Sail the "Great Green Fleet": DoN will demonstrate a Green Strike Group in local operations by 2012 and sail it by 2016. 3. Reduce Non-Tactical Petroleum Use: By 2015, DoN will reduce petroleum use in the commercial fleet by 50 percent. 4. Increase Alternative Energy Ashore: By 2020, DoN will produce at least 50 percent of shore-based energy requirements from alternative sources; 50 percent of U.S. Navy and Marine Corps installations will be net-zero 5. Increase Alternative Energy Use DoN-Wide: By 2020, 50 percent of total energy consumption will come from alternative sources. http://greenfleet.dodlive.mil/energy/ (last visited Aug. 1, 2013).
[138] U.S. NAVY, ENERGY, ENVIRONMENT AND CLIMATE CHANGE, Great Green Fleet, http://greenfleet.dodlive.mil/energy/great-green-fleet/,(last visited Aug. 1, 2013). The Great Green Fleet is named in honor of President Theodore Roosevelt's Great White Fleet, which helped usher in America as a global power on the world stage at the beginning of the 20th Century.
[139] *Id.*

HOON (DDG 93), USS PRINCETON (CG 59) and USNS HENRY J KAISER (T-AO 187) participated in the demonstration.[140] The ships and aircraft in the Great Green Fleet demonstration were powered by alternative fuel, either nuclear or advanced biofuel blends.[141] The biofuel blends were 50-50 mixtures of biofuel (made from used cooking oil and algae) and petroleum-based marine diesel or aviation fuel.[142] Approximately 450,000 gallons of 100percent "neat" biofuel were purchased in 2011 in preparation for the Great Green Fleet demonstration.[143] U.S. Navy surface ships were powered using 350,000 gallons of hydroprocessed renewable diesel (HRD-76) blended with an equal amount of marine diesel (F-76).[144] U.S. Navy aircraft burned 100,000 gallons of hydroprocessed renewable jet fuel (HRJ-5) blended with aviation fuel (JP-5).[145] The Great Green Fleet demonstration also included maritime efficiency measures.[146] The exercise successfully demonstrated the efficacy of advanced drop-in biofuels, as no negative impacts on the platforms or their capabilities were observed.

However, for the Great Green Fleet demonstration, the Pentagon paid 12 million dollars for 450,000 gallons of biofuel, which amounted to almost 27 dollars a gallon.[147] Republican lawmakers immediately criticized the price, comparing it unfavorably to the

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[140] *Id.*
[141] *Id.*
[142] *Id.*
[143] *Id.*
[144] *Id.*
[145] *Id.*
[146] Solid state Lighting, Gas Turbine On-Line Water Wash, Shipboard Energy Dashboard, Smart Voyage Planning Decision Aid, and Stern Flaps, http://greenfleet.dodlive.mil/energy/great-green-fleet/, last visited July 15, 2013.
[147] David Alexander, *Insight: "Green Fleet" Sails, Meets Stiff Headwinds in Congress*, REUTERS (July 2, 2012), http://www.reuters.com/article/2012/07/02/us-usa-U.S. Navy-greenfleet-idUSBRE86106X20120702.

market price of three dollars and sixty cents a gallon for conventional fuel.[148] These and other critics argued the program was a waste of money at a time when the nation was struggling with an enormous budget deficit while at the same time undergoing a shale "oil boom."[149] Despite the criticism, the U.S. Navy continued to pursue the development of a domestic industry for advanced drop-in biofuels produced from non-food feedstock that require no more than 50 percent cost share from the government. In response to the critics who ask why the U.S. Navy is involved in the development of new energy sources Secretary Mabus stated, "The U.S. Navy has always been a leader in energy and propulsion technologies, moving from sail to coal in the 19th century, to oil at the start of the 20th, and to nuclear power in the 1950s.

In 2011, the Departments of the U.S. Navy, Energy and Agriculture signed an MOU to support the development of a sustainable commercial biofuel industry.[150] The MOU argues that, given the current economic outlook, risks associated with startup companies, and competitive barriers posed by the established conventional oil market, the advanced drop-in biofuel industry requires government investment to reach commercial capacity in a timely manner.[151]

Following an official presidential determination that advanced biofuels are essential to national defense, the Defense Production Act Title III Program published a

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[148] *Id.* Senator John McCain, said "I don't believe it's the job of the U.S. Navy to be involved in building ...new technologies."
[149] *Id.*
[150] Memorandum of Understanding Between the Department of the U.S. Navy and the Department of Energy, and the Department of Agriculture (June 2011), *available at* http://www.rurdev.usda.gov/SupportDocuments/DPASignedMOUEnergyU.S. NavyUSDA.pdf
[151] *Id.*

Funding Opportunity Announcement for an "Advanced Drop-in Biofuels Production Project." The announcement requested proposals from domestic sources to execute the project, and focused on the creation of an economically viable production capacity for advanced drop-in biofuels.[152] Shortly thereafter, a Request for Information was issued which sought proposals for integrated biorefineries where substantially all of the business activities take place domestically (U.S. or Canada), including feedstock growth, processing, fuel production, blending and distribution.[153] The request specified that the drop-in biofuels must function at least as well as the petroleum product displaced at their maximum blend per applicable specification (i.e. 50/50 HRJ-5 or HRD-76).[154] Companies will be required to develop capacity for commercial scale production, with a minimum output of 10 million gallons neat fuel per year with 50 percent minimum private industry cost share.[155] The responsive fuels are required to be EISA 526 compliant bio-derived fuels with lifecycle greenhouse gas emissions less than or equal to conventional fuel being replaced.[156] Finally, there could be no intermediate or long-term impact on supply of agricultural commodities involved in food production, as determined by USDA.[157]

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[152] DEPARTMENT OF THE AIR FORCE, ADVANCED DROP-IN BIO FUELS PRODUCTION PROJECT, (June 27, 2012), *available at* https://www.fbo.gov/index?s=opportunity&mode=form&id=6c9c1fb4efd373efb6c7096142c681f7&tab=core&_cview=0.

[153] DEPARTMENT OF THE AIR FORCE, AIR FORCE MATERIEL COMMAND, Request for Information: Defense Production Act Title III Technology for advanced Drop-in Biofuels Production Market Research (Aug. 29, 2011), *available at* https://www.fbo.gov/index?s=opportunity&mode=form&id=e63ff978dc9078d2223687cb7f099b0c&tab=cor.

[154] *Id.*

[155] *Id.*

[156] *Id.*

[157] *Id.*

The U.S. Navy received criticism for the initiative, namely that it had overstepped its mission in attempting to develop an industry and that the endeavor was too costly in times of economic hardship. In a study called for by the Duncan Hunter National Defense Authorization act of 2009, a RAND Corporation analyst found that, "the use of alternative fuels offers the armed services no direct military benefit." The report concluded that fuels made from plant waste or algae will not be achievable in large or cheap enough quantities for the U.S. Navy to meet its goal of using eight million barrels per year of biofuels at a reasonable cost, so they were not suited for military applications in the next decade. [158] Regarding biofuels made from plant waste or animal fats, the RAND analyst found that the amount of feedstock is limited and no more than about 25,000 barrels per day will be produced by 2020. The RAND analyst said he did not think seed oil fuels would ever be available in large quantities since the land use needs to grow the feedstock would be too large, requiring 10 percent of U.S. croplands currently under cultivation to produce just one percent of the country's fuel needs each day, and he questioned the greenhouse gas benefits of such fuels. The author urged the military and Congress to rethink dedicating defense appropriations to alternative fuels research, concluding that "the military is best served by efforts directed at using energy more efficiently in weapon systems and at military installations."[159] The RAND report noted that if the DOD continues to finance alternative fuels it should also limit how many

[158] Dina F. Maron, *Biofuels of No Benefit to Military – RAND* (January 25, 2011), NEW YORK TIMES http://www.nytimes.com/cwire/2011/01/25/25climatewire-biofuels-of-no-benefit-to-military-rand-11643.html.

[159] JAMES T. BARTIS, LAWRENCE VAN BIBBER, ALTERNATIVE FUELS FOR MILITARY APPLICATIONS (2011)(RAND CORPORATION, NATIONAL DEFENSE RESEARCH INSTITUTE) *available at* http://www.rand.org/content/dam/rand/pubs/monographs/2011/RAND_MG969.pdf.

resources it puts toward testing and certifying biofuel blends like those derived from camelina and algae. "Demonstrating technical viability is easy; consider the history of photovoltaic power and fuel cells. But demonstrating affordable and environmentally sound production ... is difficult," the report stated.

The RAND analyst concluded that even though part of the rationale of reducing our dependence on oil is to cut down on current investments of money and lives to protect the supply and transport of oil, alternative fuels would also require safeguarding. Forward-based military units would, as they are now, be assigned the task of protecting the supply chain and ensuring the delivery system is free of threats. The logistic and operational challenges of assigning military units these two tasks exceeds the problem of supplying fuel (conventional or alternative) produced outside the forward zone and transported to fighting forces via convoys or tanker aircraft and ships, and introduces dangers to service members.

Tom Hicks, Deputy Assistant Secretary of the Navy for Energy disputed the findings of the report, stating;

> The lack of engagement with the leading voice on alternative energy, the secretariat, has caused us to have reservations about this report. We haven't been consulted or asked to provide input on the secretariat level. Unfortunately we think there are some misrepresentations and some factual errors regarding to the Navy's certification and testing efforts. Based on active engagement with alternative fuel and biofuels industry, we have come up with far different conclusions than are indicated in the RAND report.[160]

[160] Abdy Medici, *RAND Corp. Report Criticizes Navy Biofuel Goals*, THE NAVY TIMES (Jan. 25, 2011), http://www.navytimes.com/article/20110125/NEWS/101250320/Rand-Corp-report-criticizes-Navy-biofuel-goals.

One energy observer also disputed the finding of the report, arguing that it overlooks the strategic importance of developing alternatives to petroleum fuels.[161] His analysis points out that it is a strategic mistake for the military to rely on a single source for 80 percent of the military's energy needs. The RAND report placed too much emphasis on the hurdles inherent in the development of a new industry, saying that renewable fuels are likely to remain "far more expensive" than petroleum products absent a technological breakthrough."[162] However, the prediction made in 2009 already sounds out of date in 2013 given the fact that four companies have partnered with U.S. Navy to produce biofuel for four dollars per gallon, and that the commercial aviation industry has a purchase agreement for cost-competitive biofuel.[163] Therefore, there is no reason to believe that conventional oil is the only acceptable source of liquid fuel for the U.S. military and continue to accept the risks of price volatility of the world oil market.

As of June 2013, DOD will contribute 100 million dollars total, drawn from the money appropriated for the DPA Fund in the 2012 Department of Defense Appropriations Act[164] The Navy has committed an initial 60 million dollars from the Navy's drop-in biofuels initiative as part of the total 89 million dollar request for the

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[161] Andrew Holland, *Why the RAND Report on Biofuels and the U.S. Military has it Wrong*, ENERGY TRENDS INSIDER, (June 20, 2012) http://www.energytrendsinsider.com/2012/06/20/why-the-rand-report-on-biofuels-and-the-u-s-military-has-it-wrong/

[162] BARTIS, *supra* note 159.

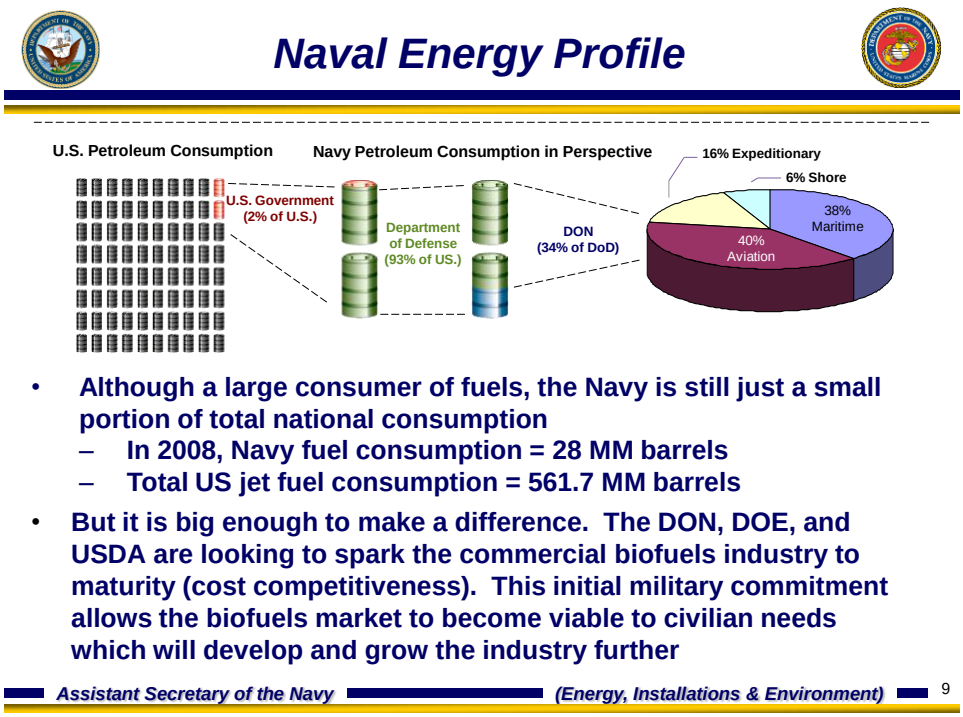
[163] *United to Purchase Biofuels from AltAir Fuels*, BIOMASS MAGAZINE (July 1, 2013) http://biomassmagazine.com/articles/9156/united-to-purchase-biojet-from-altair-fuels/.

[164] Consolidated Appropriations Act, 2012, Pub. L. 112-74, 125 Stat. 786 (Dec. 23, 2011).

DPA fund in the DOD's 2013 budget request.[165] DOE will contribute 40 million dollars, once authorized, as requested in DOE's 2013 budget request. The USDA will make its total 161 million dollar contribution through the Commodity Credit Corporation Act which will be paid toward the price of the feedstock, thereby lowering the overall cost per gallon.[166]

The biofuel initiative provides an opportunity to decrease the U.S.'s reliance on oil, reduce the related costs of securing oil supply and safe transport and therefore increase energy security. As seen in the figure below, "Naval Energy Profile" a timely investment in the biofuel industry will have a major and positive effect. The U.S. Navy consumes, on average, 30 million barrels of oil a year, or 34 percent of total DOD consumption, and it is a big enough customer to send a demand signal to advanced biofuel companies which will spur the development of a full-fledged advanced biofuel industry.

[165] OFFICE OF THE SECRETARY OF DEFENSE, Department of Defense 2013 President's Budget Submission, February 2012. *available at* http://comptroller.defense.gov/budget2013.html.
[166] U.S. DEPARTMENT OF AGRICULTURE, FY2013 Budget Summary and Annual Performance Plan. P.L. 80-806.




***Source: Chris Tindal, Director for Operational Energy, Office of the Deputy Assistant Secretary of the U.S. Navy for Energy***

### A. Legislation Regarding Biofuels

Although there is much to be said for new technology, the major obstacle to the development of new sources is "international affairs, politics, decision-making by governments, and energy investment and new technological development."[167] Legislative debate over the biofuel initiative became a political issue which threatened the continued existence of the project. Lawmakers opposed to the initiative centered on two issues; proposals to the NDAA to limit DOD's authority to purchase biofuels or to invest in biofuel production capacity, and appropriations related to the USDA, DOE, and U.S. Navy biofuel production initiative.

[167] Yergin, *supra* note 58, at 75.

In 2012, National Defense Authorization Act FY 2013 H.R. 4310 contained an exemption for the DOD from the requirements of EISA 526 and prohibited the purchase of alternative fuel if it was more costly than conventional fuel. Concerns about defense spending on biofuel lead the Senate Armed Services Committee to approve amendments to the National Defense Authorization Act S. 3254 which limited the DOD's access to biofuel markets and its ability to participate in the creation of commercial infrastructure for the biofuel industry. However, the next day, the Senate passed an amendment to the defense bill struck the prohibition on biofuel refinery construction and the provision which limited the ability of the DOD to purchase alternatives fuels when their costs exceed conventional fuels. The amendment allows the DOD to use money from the Defense Production Act to invest in refineries for biofuels to create an infrastructure once the DOE and USDA make matching or equivalent contributions. Opponents argued that with defense spending already on the shopping block, this is not way to spend money. However, the Pentagon contended that "investment in alternative fuels represent less than four percent of the …total planned investment in operational energy initiatives over the next five years, and less than 0.6 percent of what the department spent on fuel last year."

Also in 2012, the Senate voted against Republican-sponsored legislation that would have banned the DOD from pursuing its biofuel initiative if the cost of the fuel was more than conventional fossil fuels.[168] While Democrats lead the effort against

[168] David Alexander, *Senate Strikes Restriction on Military Biofuel Development*, (Nov. 28, 2012), REUTERS http://www.reuters.com/article/2012/11/28/us-usa-defense-biofuels-idUSBRE8AR17G20121128.

the legislation, Republicans from farm states who stand to benefit from increased biofuel production also voted against it. The agriculture energy programs contained in the Farm Bill produce huge benefits for rural communities. From 2008 to 2012, for instance, the Renewable Energy for America Program supported 7,600 U.S. projects that generated or saved more than 7.3 billion kilowatt hours of electricity – enough to power 680,000 U.S. homes annually. The Biorefinery Assistance Program (BAP) is aiding efforts to build cutting-edge biorefineries to produce advanced biofuels in states from Florida to Michigan and New Mexico. And with important changes in the Senate-passed bill, the program would support promising renewable chemical projects across the country. The Senate Bill authorizes 20 million dollars annually in discretionary funds, while the House authorizes 50 million dollars per year, also discretionary. Congress has yet to pass the Farm Bill.[169] Once the issue became politicized, the biofuel initiative narrowly survived the legislative machinations of the past two years. If legislators were willing to support the ethanol industry to maturation, they should be willing to support the advanced drop-in biofuel industry, which is more beneficial because it is compatible with existing petroleum infrastructure and military platforms.

### B. Biofuel Pathways and Technology

Although the U.S. Navy conducted the Great Green Fleet demonstration with biofuel blends which were made from used cooking oil and algae, it does not prefer one

[169] JONATHAN WEISMAN, *House Republicans Push Through Farm Bill, Without Food Stamps*, THE NEW YORK TIMES (July 11, 2013) http://www.nytimes.com/2013/07/12/us/politics/house-bill-would-split-farm-and-food-stamp-programs.html?pagewanted=all.

feedstock or pathway over another. As the industry develops, the most effective and lowest-cost biofuels should emerge and the market will respond by purchasing those fuels.

The National Renewable Energy Laboratory has identified three applications of biomass;

1. biofuels which convert biomass to liquid transportation fuels,
2. biopower which burns biomass directly or, after conversion into more efficiently burning gaseous or liquid fuels, to generate electricity, and
3. bioproducts which convert biomass into chemicals for various applications including substitutes for conventional petroleum products.[170]

There are three major pathways for converting biomass into biofuels;

1. biochemical conversion which produces alcohols, including ethanol and butanol,
2. thermochemical conversion which applies heat and other catalysts to convert biomass to synthetic gas or an intermediate bio-oil. Synthetic gas and bio-oil can then be processed into long-chain hydrocarbon fuels (including diesel and natural gas), and
3. lipid processing which converts plant and/or animal oils, fats and greases and converts them to bio-diesel or other long-chain hydrocarbon fuels such as gasoline or jet fuel.[171]

Three major types of biomass used to produce fuel are:

1. general plant mass including cellulosic and hemi-cellulosic plant mass that is not part of human diet and is not cultivated or is a byproduct of cultivated (for example forest woody biomass, corn stover, sugar cane biomass),
2. food crops- crops grown for human consumption that contain sugars or oils which can be converted into alcohols or long-chain hydrocarbons (for example corn and sugar cane), and
3. non-food crops- grown for the express purpose of producing oils for conversion into long-chain hydrocarbon (for example algae, camelina and jatropha).[172]

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[170] NATIONAL RENEWABLE ENERGY LABORATORY, LEARNING ABOUT RENEWABLE ENERGY, *available at* http://www.nrel.gov/learning/re_biomass.html (last visited July 15, 2012).

[171] DEPARTMENT OF ENERGY, BIOENERGY TECHNOLOGIES OFFICE, PROCESSING AND CONVERSION, http://www1.eere.energy.gov/bioenergy/processing_conversion.html (last visited 15 July, 2013).

Production of alcohol from biomass by way of fermentation of plant sugars creates ethanol. Ethanol can be used in engines which have been designed or modified for such use, but is not fungible with gasoline and therefore must have a separate distribution system, as well as specifically-designed engines. The U.S. and Brazil are the world's largest producers of ethanol, made from corn and sugar cane respectively.[173] The Renewable Fuel Standard mandates that at least 37 percent of the 2011-12 corn crop be converted to ethanol and blended with the gasoline that powers our cars.[174] However, the ethanol mandate has caused corn demand to outstrip supply and the global price of corn has tripled in recent years.[175] Corn ethanol has many critics who point out that it does not offer substantial improvements over conventional fuels regarding sustainability. Furthermore, corn ethanol is only 12 percent efficient; and a heavy reliance can negatively impact the food market.[176] Corn ethanol produces only a 19 percent reduction in life-cycle greenhouse gasses emissions relative to fossil fuels.[177] Compared to

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[172] U.S. DEPARTMENT OF ENERGY, BIOENERGY TECHNOLOGIES OFFICE, BIOMASS FEEDSTOCKS, http://www1.eere.energy.gov/bioenergy/biomass_feedstocks.html#Advanced_Uniform_Format_Feedstock_Supply (last visited July 15, 2013).

[173] Ryan Tracy, *U.S. Corn-Ethanol Producers: Curb Imports from Brazil*, THE WALL STREET JOURNAL (Jan. 30, 2013) http://online.wsj.com/article/SB10001424127887324610504578273842341906004.html.

[174] Colin Carter and Henry Miller, *Corn for Food, Not Fuel*, THE NEW YORK TIMES, (July 30, 2012), http://www.nytimes.com/2012/07/31/opinion/corn-for-food-not-fuel.

[175] Jeff Wilson, *USDA Says Corn Inventory May Triple to 26-Year High*, BLOOMBERG, (Feb. 22, 2013) http://www.businessweek.com/news/2013-02-22/u-dot-s-dot-corn-reserves-seen-jumping-to-26-year-high-on-record-crop.

[176] David Biello, *Can Ethanol from Corn Be Made Sustainable?*, SCIENTIFIC AMERICAN (Feb. 20, 2013), *available at* http://www.scientificamerican.com/article.cfm?id=can-corn-ethanol-be-made-sustainable

[177] U.S. DEPARTMENT OF ENERGY, BIOMASS PROGRAM, *Enhancing Benefits While Mitigating Concerns: Biofuels Sustainability, available at* http://www1.eere.energy.gov/bioenergy/pdfs/sustainability_four_pager.pdf (last visited July 15, 2013).

switchgrass diesel or TC ethanol, which provide an approximately 70 percent reduction, ethanol's greenhouse gases reduction is relatively low.[178] The bulk of corn ethanol currently produced in the U.S. is non-cellulosic. Cellulosic ethanol is produced from non-food plant matter such as corn stover, switchgrass, landscaping plant byproducts, woods, and grasses.[179] Cellulosic ethanol technology will become cost-competitive in the near future.[180] However, the U.S. Navy cannot use ethanol in its existing platforms, and therefore it is not a viable option to diversify its energy sources. It is relevant to the debate over the advanced biofuel initiative because the ethanol industry has benefitted from federal subsidies and the exemption under EISA from the requirement to produce fuel which produces a 20 percent reduction in greenhouse gases. If legislators were willing to support the ethanol industry to maturation, they should be willing to support the advanced drop-in biofuel industry, which is compatible with existing petroleum infrastructure and military platforms.

Long-chain hydrocarbon fuels can be created which have similar physical and chemical properties to traditional petroleum products. Some of the long-chain hydrocarbon fuels (such as renewable diesel and renewable jet fuel) can be used as direct substitutes, or drop-in replacements for petroleum-derived fuels. The U.S. Navy has determined that advanced drop-in biofuels are the most flexible and therefore best suited to its needs.

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[178] *Id.*
[179] Biello, *supra* note 177.
[180] BLOOMBERG NEW ENERGY FINANCE, *Cellulosic Ethanol Heads for Cost-Competitiveness by 2016*, (Mar. 12, 2013) http://about.bnef.com/press-releases/cellulosic-ethanol-heads-for-cost-competitiveness-by-2016/. Ethanol manufactured from non-food "cellulosic" feedstock is on course to be cost competitive with corn-based ethanol by 2016, according to an industry survey conducted by research company Bloomberg New Energy Finance.

The two main pathways being currently certified for production of renewable jet fuel are biomass-to-liquid (BTL) by Fischer-Tropsch and hydroprocessing of lipids.[181] Developed in 1923 to produce liquids from coal, the Fischer-Tropsch process has been modified to use cellulosic biomass and natural gas as inputs. Fuel produced using a Fischer-Tropsch process was certified for aviation by ASTM International Standard D7566 in September 2009.[182] However, the Fischer-Tropsch fuels create a larger carbon footprint than projects using plant oils. Hydroprocessing to create Hydrotreated Renewable Jet (HRJ) fuel uses water, hydrogen, and a catalyst as inputs. On July 1, 2011, ASTM approved the jet fuel product slate of Hydroprocessed Esters and Fatty Acids (HEFA) under alternative fuel specification D7566.[183] The HEFA feedstock comes from renewable oils (vegetable oils, animal fats, waste grease and algae oil) which bring into consideration the issues of land use, water consumption, use of fertilizers and pesticides can therefore indirectly impact the world food market.[184]

The U.S. Navy would consider all non-food feedstock, and is "feedstock agnostic" according to the Deputy Assistant Secretary of the U.S. Navy (Energy), Tom Hicks.[185]

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[181] COMMERCIAL AVIATION ALTERNATIVE FUELS INITIATIVE, *Path to Alternative Jet Fuel Readiness* (March 10, 2013), http://www.caafi.org/information/pdf/Path_to_Aviation_Alternative_Fuel_Readiness_May_2013.pdf.

[182] ASTM INTERNATIONAL, *Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons*, http://www.astm.org/Standards/D7566.htm

[183] *Id.*

[184] NIVEN WINCHESTER, DOMINIC MCCONNACHIE, CHRISTOPH WOLLERSHEIN, IAN A. WAITZ, Market Cost of Renewable Jet Fuel Adoption in the United States, MIT JOINT PROGRAM ON THE SCIENCE AND POLICY OF GLOBAL CHANGE, (January 2013), *available at* http://globalchange.mit.edu/files/document/MITJPSPGC_Rpt238.pdf.

[185] Will Nichols, *Case Study: U.S. Navy's Great Green Fleet Sets Sail for Sustainable Shores*, BUSINESS GREEN (March 22, 2013), http://www.businessgreen.com/bg/feature/2255538/case-study-us-U.S. Navys-great-green-fleet-sets-sail-for-sustainable-shores.

The U.S. Navy's replacement drop-in system uses a 50/50 biofuel/petroleum blend. The following criteria have been set forth for alternative fuel sources:

1. A drop-in replacement for petroleum-based fuel, which meets or exceed the performance requirements of petroleum-based fuel,
2. able to mix or alternate with petroleum fuel,
3. requiring no modifications or enhancements to the configuration of the aircraft or ship, and
4. requiring no modifications of enhancements to the U.S. Navy's existing fuel storage infrastructure.[186]

This not only rules out corn ethanol, the United States' largest source of biofuel, but effectively enforces the use of advanced sustainable fuels derived from waste residues or algae. As of July 2013, hydroprocessed renewable jet fuel (HRJ-5) had been certified both by the Military (MILSPEC), as well as ASTM standards. Hydroprocessed renewable diesel (HRD-76) is expected to be approved by the end of 2013.[187]

The biofuel initiative has already made significant progress. As of June 19, 2013, Phase I awards for planning and preliminary design of biofuel production facilities have been made with four biofuel companies. Two of the companies will produce fuel using HEFA and two will use and Fischer Tropsch gasification. The biofuel companies have promised to deliver 170 million gallons of drop-in renewable fuels compatible with the Navy's conventional fuels (JP-5,8 and F-76) by 2016. The weighted average price in 2013 dollars is less than four dollars per gallon which is cost-competitive with conventional petroleum.[188] For the Navy to meet its goal to draw 50 percent of total energy consumption from alternative sources,[189] it will require 336 million gallons of

[186] Interview with Chris Tindal, *supra* note 34.
[187] *Id.*
[188] *Id.*
[189] SECRETARY OF THE U.S. NAVY, ENERGY GOALS, *supra* note 134.

biofuel in 2020. If all four projects awarded contracts under Phase I deliver on target, the Navy will be halfway to that goal. Thus, as an energy consumer seeking to reduce its reliance on conventional petroleum in order to complete its mission, the U.S. Navy has a vested interest in accelerating the development of the domestic advanced drop-in biofuel industry.

### C. Aviation Industry Biofuel Development

The aviation industry is also pursuing advanced biofuels, and the U.S. Navy should continue to work with and track their progress in obtaining cost-competitive advanced drop-in biofuels. With both customers sending a demand signal, the chance for success of the advanced drop-in biofuel industry is increased. Like the U.S. Navy, the aviation community is focused on "drop-in" fuels that have been shown to be functionally identical to petroleum-derived jet fuel.[190] The aviation industry is driven by the price of oil. In 2012, the price of crude oil increased by 262 percent, accounting for nearly 40 percent of an airline's total operating costs.[191] Given current oil prices, airlines have been struggling to make money. Fuel prices were cited as a factor in the bankruptcy filing of AMR Corp., the parent of American Airlines.[192] The industry's profitability is low, with profit margins that do not cover the cost of capital."[193] At the same time,

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[190] COMMERCIAL AVIATION ALTERNATIVE FUELS INITIATIVE, *Path to Alternative Jet Fuel Readiness*, *supra* note 181.
[191] INTERNATIONAL AIR TRANSPORT ASSOCIATION, *Fact Sheet: Fuel* http://www.iata.org/pressroom/facts_figures/fact_sheets/pages/fuel.aspx.
[192] Christian Berthlesen, *Explaining High Oil Prices*, THE WALL STREET JOURNAL (Dec. 14, 2011), http://online.wsj.com/article/SB10001424052970203833104577072301052759854.html
[193] A.B., *Airline Profitability, Struggling to Take Off*, THE ECONOMIST (Oct. 1, 2012), http://www.economist.com/blogs/gulliver/2012/10/airline-profitability.

growth in demand for air services globally is expected to increase over the next 20 years.[194]

After Solazyme began supplying the military with small quantities of algae biofuels for evaluation, the DOD awarded the company its first significant contract in 2010.[195] The next year a United Airlines 737 flew the first commercial biofueled flight on Solayzme's Solajet fuel. "The fact that we could even make that United flight was a direct result of the work we had been doing with the U.S. Navy," said the company's founder, Jonathan Wolfson.[196]

In July 2010, USDA, Airlines for America, Inc. (A4A) and the Boeing Company (Boeing) formally agreed to work together on the "Farm to Fly" initiative.[197] "Farm to Fly" builds upon the work of USDA's Regional Biomass Research Centers, which are helping to develop a robust, advanced biofuels industry by working with industry partners to produce energy-producing feedstock within different regions.[198] In April, 2013 USDA renewed its agreement to work with the FAA for another five years.[199] The

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[194] INTERNATIONAL AIR TRANSPORT ASSOCIATION, *Study: Airlines Will be Challenged to Meet Forecast Demand Growth*, (July 1, 2013) available at http://www.iata.org/pressroom/pr/Pages/2013-07-01-01.aspx.
[195] Todd Woody, *The U.S. Military's Great Green Gamble Spurs Biofuel StartupS,* FORBES (Sept 24, 2012) http://www.forbes.com/sites/toddwoody/2012/09/06/the-u-s-militarys-great-green-gamble-spurs-biofuel-startups/2/
[196] Id.
[197] U.S. DEPARTMENT OF AGRICULTURE, *Farm to Fly – Working Together Resolution, available at* http://www.usda.gov/documents/usda-farm-to-fly-resolution-july-2010.pdf.
[198] U.S. DEPARTMENT OF AGRICULTURE, *Agriculture and Aviation: Partners in Prosperity* (Jan. 9, 2012) http://www.usda.gov/documents/usda-farm-to-fly-report-jan-2012.pdf.
[199]U.S. DEPARTMENT OF AGRICULTURE, *News Release, Agriculture Secretary Vilsack and Transportation Secretary LaHood Renew Agreement to Promote Renewable Fuels in the Aviation Industry* (April 15, 2013)

U.S. Federal Aviation Administration (FAA) has set a goal for the US aviation industry to consume one billion gallons of renewable jet fuel each year from 2018 onwards.[200] This amount includes the renewable aviation fuel targets set by the US Air Force (USAF), the U.S. Navy, and commercial aviation. The USAF goal is equivalent to 0.37 billion gallons per year, the U.S. Navy goal amounts to 0.28 billion gallons per year, and commercial aviation's contribution to the overall 0.35 billion gallons per year. [201] Predicted jet fuel consumption by U.S. commercial airlines in 2018 is 20.2 billion gallons; therefore the target for commercial aviation represents 1.7 percent of total fuel consumed by this industry.[202] If the cost of renewable jet fuel remains above the price of conventional fuel and in the absence of blending requirements for sales of jet fuel, the FAA biofuel goal will be met by commercial airlines and the US military voluntarily purchasing renewable fuel.

A study conducted in 2013 has found that the near-term uptake of biofuels will be greatest when oil crops are used in a HEFA process and conducted an economic analysis focused on meeting the FAA aviation biofuel goal using HEFA-derived fuel.[203] The study concluded that if "soybean oil is used as a feedstock, meeting the aviation biofuel goal in 2020 will require an implicit subsidy to biofuel producers of two dollars and

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http://www.usda.gov/wps/portal/usda/usdahome?contentid=2013/04/0070.xml&contentidonly=true

[200] ASTM INTERNATIONAL, STANDARDS. http://www.astm.org/Standard/index.shtml, (last visited July 15, 2013). A recent revision to ASTM D7566 allows new components to be manufactured from jatropha, camelina, and fats and combined with conventional aviation jet fuel.

[201] NIVEN WINCHESTER, DOMINIC MCCONNACHIE, CHRISTOPH WOLLERSHEIN, IAN A. WAITZ, Market Cost of Renewable Jet Fuel Adoption in the United States, *supra* note 184.

[202] *Id.*

[203] *Id.*

sixty-nine cents per gallon of renewable jet fuel. If the aviation goal can be met by fuel from oilseed rotation crops grown on otherwise fallow land, the implicit subsidy is thirty-five cents per gallon of renewable jet fuel."[204]

On June 4, 2013, United Airlines signed a purchase agreement with AltAir Fuels for cost-competitive, sustainable, advanced biofuels on a commercial scale.[205] AltAir Fuels will retrofit part of an existing petroleum refinery to become a 30 million gallon advanced biofuels refinery near Los Angeles, California.[206] The facility will convert non-edible natural oils and agricultural wastes into approximately 30 million gallons of low-carbon, advanced biofuels and chemicals per year.[207] United has collaborated with AltAir Fuels since 2009 and has agreed to buy 15 million gallons of lower-carbon, renewable jet fuel over a three-year period, with the option to purchase more.[208] The airline is purchasing the advanced biofuels at a price competitive with traditional, petroleum-based jet fuel, and AltAir expects to begin delivering five million gallons of renewable jet fuel per year to United starting in 2014.[209]

Advanced biofuel prices have dropped dramatically since the U.S. Navy first purchased test amounts. More will follow as the business case for biofuel improves, a development helped along by rising oil prices and the carbon-trading scheme for commercial aviation that took effect in the European Union last year. Although

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[204] *Id.*
[205] Staff Writer, *United to Purchase Biofuels from AltAir Fuels*, BIOMASS MAGAZINE (July 1, 2013) http://biomassmagazine.com/articles/9156/united-to-purchase-biojet-from-altair-fuels/.
[206] *Id.*
[207] *Id.*
[208] *Id.*
[209] *Id.*

international compliance has been deferred, all flights within and between EU countries and Iceland, Liechtenstein, and Norway must either fly on drop-in biofuels or pay to offset their carbon emissions. Combined with the aviation industry, the U.S. Navy can send a strong enough demand signal to biofuel industry to create a stable market.

### D. Long-Term Contracting Authority

The Defense Logistics Agency (DLA) purchases fuel from suppliers worldwide and resells it to DOD.[210] DLA awards fuel contracts to the lowest bidder, based on the cost to the point of delivery. [211] DLA then sells the fuels to the DOD customers who pay for the fuel out of their Operations and Management budgets. Currently, DLA contracting authority is limited to a base contract of up to five years.[212] Many have advocated for a change in the law to provide long-term (ten years) contracting authority for the procurement of renewable fuel for use by the armed forces arguing that long-term contracts would provide significant market stability for small companies trying to commercialize new technologies and would help them to attract private investment to build the small biorefineries in strategic locations around the world that the military needs.[213] The proposal would provide increased flexibility for the purchase of renewable

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[210] DEFENSE LOGISTICS AGENCY, DLA At a Glance, http://www.dla.mil/Pages/ataglance.aspx, last visited July 15, 2013.
[211] DEFENSE ENERGY SUPPORT CENTER, FACTBOOK FY11, available at http://www.energy.dla.mil/energy_enterprise/Documents/Factpercent20Bookpercent20FY2011percent20Rev.pdf.
[212] 10 U.S.C. 2304a Task and delivery order contracts: general authority 2011
[213] *See*, Letter from Frank Kendall, Under Secretary of Defense for Acquisition, Technology and Logistics to Carl Levin, Chairman, Senate Committee on Armed Services (Aug. 6, 2012). http://energy.defense.gov/Portals/25/Documents/Reports/20120806_Long_Term_Contracting_for_Alternative_Fuels_Report.pdf "Industry experts have informed the Department that the long-term contract authority provided in 10 U.S.C. 2304a is not sufficient to

fuels, which potential suppliers tell DoD is needed due to commercially underdeveloped production capabilities for these types of fuels. Renewable fuel projects are capital investment intensive, involving construction of production facilities. Proponents of the change argue that current authority for five-year base contracts, even with five years of options, is insufficient to provide enough certainty for potential manufacturers to secure financing needed to construct or expand facilities. Long-term contracts will enhance developers' ability to secure critical financing and recoup capital investments. Long-term contracts would permit DOD to obligate the Government's minimum guaranteed purchase amount annually, instead of obligating at award the guaranteed minimum order amount for the entire contract period. Both the House and the Senate have indicated their interest in extending the contracting authority for renewable fuels, but the proposed legislation has thus far not made progress. Legislation allowing for long-term contract authority for DOD purchase of renewable fuels should be passed.

### E. Hedging

The commercial airline industry makes use of various hedging strategies to minimize the risk of future jet fuel price increases. [214] A simple hedge involves buying "futures" contracts to lock in prices. In 2004, the Defense Business Board convened the Fuel Hedging Task Group to examine potential ways of reducing DOD's exposure to fuel

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stimulate the private capital market or potential alternative fuels suppliers to construct or expand production facilities. Potential alternative fuels suppliers have indicated to the Department that purchase contracts of at least 10 years in duration could potentially stimulate additional capital investment in alternative fuels production."

[214] Commercial Aviation Alternative Fuels Initiative and the Airlines for America Energy Council, Guidance for Selling Alternative Fuels to Airlines (June 2013) available at http://www.caafi.org/files/CAAFI_Business_Team_Guidance_Paper_060413.pdf.

price volatility by hedging in commercial markets.[215] Although the Board Task Group concluded that DOD could feasibly hedge its fuel purchases, it gave broader support to engaging in "no-market" hedging through the Department of the Interior's Mineral Management Service. During crude oil price spikes, additional Interior Department oil could apply lease revenues to offset increasing DOD fuel costs. The Group concluded that DOD could request that the Office of Management and Budget (OMB) seek legislative authority to transfer funds from Interior to Defense, or vice versa; depending on which Department benefits from unanticipated price. The United Kingdom, France, and Israel actively manage defense fuel price risk. These countries practice price protection in order to neutralize risk, reduce volatility, stabilize their budget, insure against disaster, protect their revenue and expenditures, and facilitate fiscal change.[216]

It is premature at this time for DOD to attempt a hedging strategy. Alternative fuels are not yet able to add value as a hedge instrument. Once alternative fuels have an established price history, market liquidity (i.e., a high volume of bids and asks), then the time would be right to consider a hedging strategy.

## IV. Conclusion

This paper finds that the DPA Title III Advanced Drop-in Biofuels Production Project is a worthwhile endeavor which will enhance the energy security of the U.S. The development of a domestic advanced drop-in biofuel industry will help the nation achieve energy security by providing diversity of energy supply which will reduce the power the oil market has over the nation as a whole. As a customer seeking to reduce its reliance on

[215] Defense Business Board, Report to the Secretary of Defense, Re-examining Best Practices for DOD Fuel

[216] http://dbb.defense.gov/Portals/35/Documents/Reports/2011/FY11-6_Re-examining_Best_Practices_for_DoD_Fuel_Acquisition_2011-7.pdf

conventional petroleum in order to complete its mission within budget, the U.S. Navy has an interest in accelerating the development of the domestic advanced drop-in biofuel industry. By providing an alternate supply of energy to the U.S. Navy and all military branches, dependence on conventional oil will decrease which will reduce exposure to shock from abrupt changes in the world oil market. Reliance on politically volatile sources of oil will be reduced, which benefits national security. Finally, the availability of a domestically-produced alternate source of energy will benefit the military's budget and planning processes because it will reduce unanticipated costs associated with oil price fluctuations.

The success of the advanced biofuel industry will require a comprehensive strategy, which remains in step with national policies conducive to biofuel production and use. Notably, against the backdrop of sequestration, DOD officials initially looked to the biofuels program as a source of funds to offset cuts elsewhere in the budget, but they soon learned that money tagged for the effort could not easily be moved to other accounts because money appropriated to the DPA account can be shifted among DPA programs but requires an act of Congress to be moved to another DOD account.[217] The DOD, Navy, and Congress should not allow temporal budget concerns or the availability of conventional oil to be used as arguments for pulling the plug on the DPA Title III Advanced Drop-in Biofuels Production Project. Regardless of the temporary availability of conventional oil, the nation needs to begin the pursuit of alternate energy sources long before a crisis, like peak oil, occurs.

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**[217]** Annie Snider *BIOFUELS: White House, Pentagon at odds over refinery program*, GREENWIRE (May 22, 2013) http://www.eenews.net/stories/1059981636.